Edwards

INSTRUCTIONS
03-A301-51-883
MARCH 1985
(SUPERSEDES
03-A301-51-882

EH SERIES

MECHANICAL BOOSTER PUMPS

AND COMBINATION UNITS

Supplementary Instructions - (Combination units only)

E1M40, E2M40, E1M80, E2M80 rotary vacuum pumps	03-A344-02-88-
E1M175, E2M175, E1M275, E2M275 rotary vacuum pumps	03-A346-02-88-
ES7500 rotary piston vacuum pump	M03958

SUPPLIED BY

Edwards High Vacuum

PLASMA TECHNOLOGY

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Technical data

Pump Model	EH250	EH500	EH1200	EH2600	EH4200
Effective pumping speed (m^3h^{-1}) for air at 0.3 mbar on 50Hz supply with backing pump:					
Model E1M40 or E2M40	240	350	-	-	-
Model E1M80 or E2M80	274	400	840	-	-
Models E1M175 or E2M175	-	440	930	-	-
Models E1M275 or E2M275	-	-	1020	1900	3100
Model ES7500	-	-	-	2300	3400
Maximum rotational speed (rev min^{-1}) on 50Hz supply (speed varies with pressure)	2900	2900	2900	2900	2900
Ultimate (permanent gas) pressure (mbar), with single stage backing pump, without gas ballast	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$	$2x10^{-3}$
Total pressure (mbar), with single stage pump, with gas ballast	$2x10^{-2}$	$2x10^{-2}$	$2x10^{-2}$	$2x10^{-2}$	$2x10^{-2}$
Ultimate (permanent gas) pressure (mbar), with two stage backing pump	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$	$1x10^{-5}$
Total pressure (mbar), with two stage pump, with gas ballast	$1x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$	$1x10^{-3}$
Operating pressure range - continuous (mbar)	0 to 1000	0 to 1000	0 to 1000	0 to 1000	0 to 1000
Pressure differential (mbar) across pump determined by hydrokinetic drive	0 to 180	0 to 110	0 to 90	0 to 80	0 to 60
Motor power (kW)	1.5	1.5	3	7.5	7.5
Minimum cooling for continuous operation-Water flow at 20°C inlet temperature* ($1h^{-1}$)	-	50	120	250	250
Weight (kg)	61	74	149	308	400
Oil capacity (Edwards No.16 or Fomblin YVAC 06/6) - gear box (litres)	1.7	0.55	1.3	3.5	3.5
Oil capacity (Edwards No.16 or Fomblin YVAC 06/6) - fluid coupling (litres)	1.7	1.3	2.6	7.3	7.3
Oil capacity (Edwards No.16 or Fomblin YVAC 06/6) - oil seal reservoir (litres)	0.26	0.26	0.5	1.5	1.5

*Note: Under many conditions, the pump may operate without cooling. Contact EHV technical service for advice.

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Product Description

Mechanical booster pumps	Ordering No.
EH250 mechanical booster pump, fitted with two Co-Seals and two ISO blank flanges. For 220/240V or 380/415V, 3ph, 50Hz supply.	03-A301-51-935
EH500 mechanical booster pump, fitted with two Co-Seals and two ISO blank flanges. For 220/240V or 380/415V, 3ph, 50Hz supply.	03-A302-51-935
EH1200 mechanical booster pump, fitted with two Co-Seals and two ISO blank flanges. For 220/240V or 380/415V, 3ph, 50Hz supply.	03-A305-51-935
EH2600 mechanical booster pump, fitted with two Co-Seals and two ISO blank flanges. For 220/240V or 380/415V, 3ph, 50Hz supply.	03-A307-51-935
EH4200 mechanical booster pump, fitted with O ring, Co-Seal and two ISO blank flanges. For 220/240V or 380/415V, 3ph, 50Hz supply.	03-A309-51-935

Spares and accessories	Ordering No.
Kit of spares for - EH250 (& EH500A)	14-A301-51-800
- EH500	14-A302-51-800
- EH1200	14-A305-51-800
- EH2600	14-A307-51-800
- EH4200	14-A309-51-800
**Edwards No. 16 oil - 1 litre	09-H110-03-015
- 2.5 litres	09-H110-03-014
- 5 litres	09-H110-03-013
- 25 litres	09-H110-03-002
Co-Seal - 63mm	08-B271-58-063
- 100mm	08-B271-58-070
- 160mm	08-B271-58-074
250mm trapped O-ring	08-B271-58-143
Model ITF3000 inlet dust filter*	04-A442-12-000
Model ITM3000 high capacity inlet dust filter*	04-A443-12-000
Model ITF5000 inlet dust filter	04-A442-13-000
Model ITM5000 high capacity inlet dust filter+	04-A443-13-000

For details of other inlet accessories (IT300, IT800 series filters, also tube/collar assemblies) for use with EH250 and EH500 mechanical booster pumps - see Edwards catalogue.

*Supplied with 160mm Co-Seal, bolts and washers
+Supplied with 250mm trapped O-ring, bolts and washers

Mechanical booster/rotary pump combinations

Mechanical booster/rotary pump combinations, complete with starter and terminating in an ISO blank flange and Co-Seal.
For 220/240V or 380/415V, 3 phase, 50Hz supply.
Comprising the following pump models:

	Ordering No.
EH250/E1M40	03-A383-10-935
EH250/E2M40	03-A383-11-935
EH250/E1M80	03-A383-12-935
EH250/E2M80	03-A383-13-935
EH500/E1M40	03-A385-10-935
EH500/E2M40	03-A385-11-935
EH500/E1M80	03-A385-12-935
EH500/E2M80	03-A385-13-935
EH500/E1M175	03-A385-14-935
EH500/E2M175	03-A385-15-935
EH500/E1M275	03-A385-16-935
EH500/E2M275	03-A385-17-935
EH1200/E1M80	03-A388-12-935
EH1200/E2M80	03-A388-13-935
EH1200/E1M175	03-A388-14-935
EH1200/E2M175	03-A388-15-935
EH1200/E1M275	03-A388-16-935
EH1200/E2M275	03-A388-17-935
EH2600/E1M175	03-A392-14-935
EH2600/E2M175	03-A392-15-935
EH2600/E1M275	03-A392-16-935
EH2600/E2M275	03-A392-17-935
EH2600/ES7500	03-A339-00-935
EH4200/E1M275	03-A396-16-935
EH4200/E2M275	03-A396-17-935
EH4200/ES7500	03-A335-00-935

or **Fomblin rotary pump fluid
YVAC06/6 500ml
1 litre

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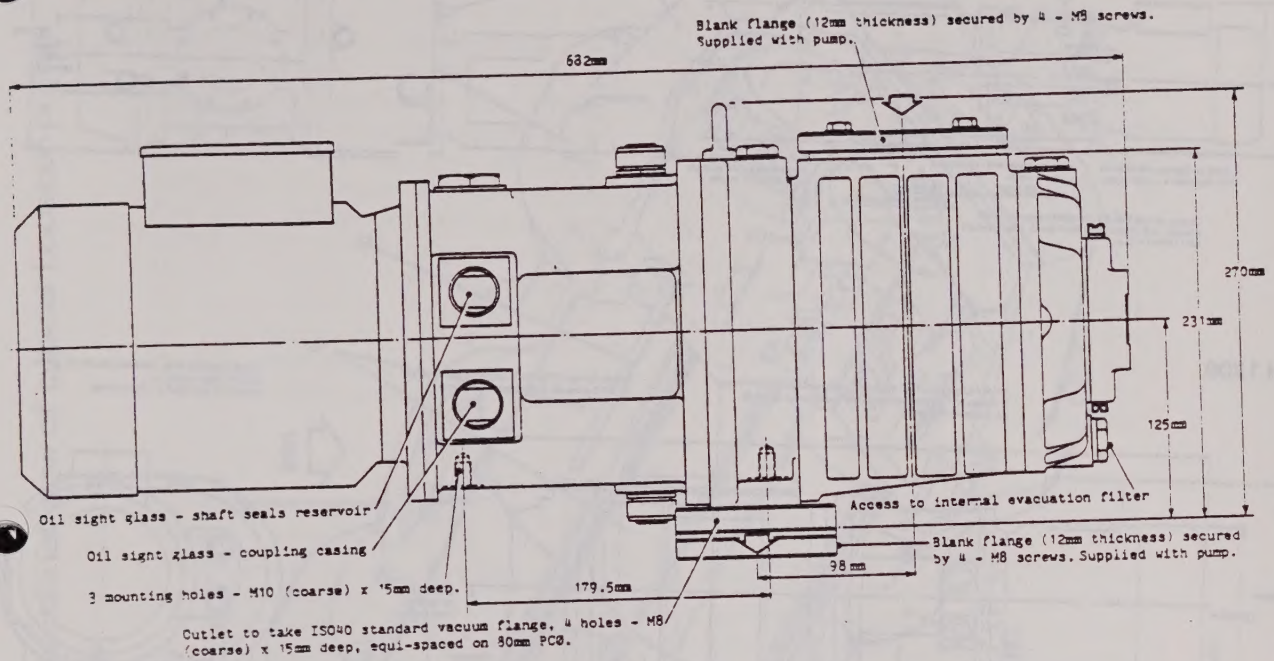
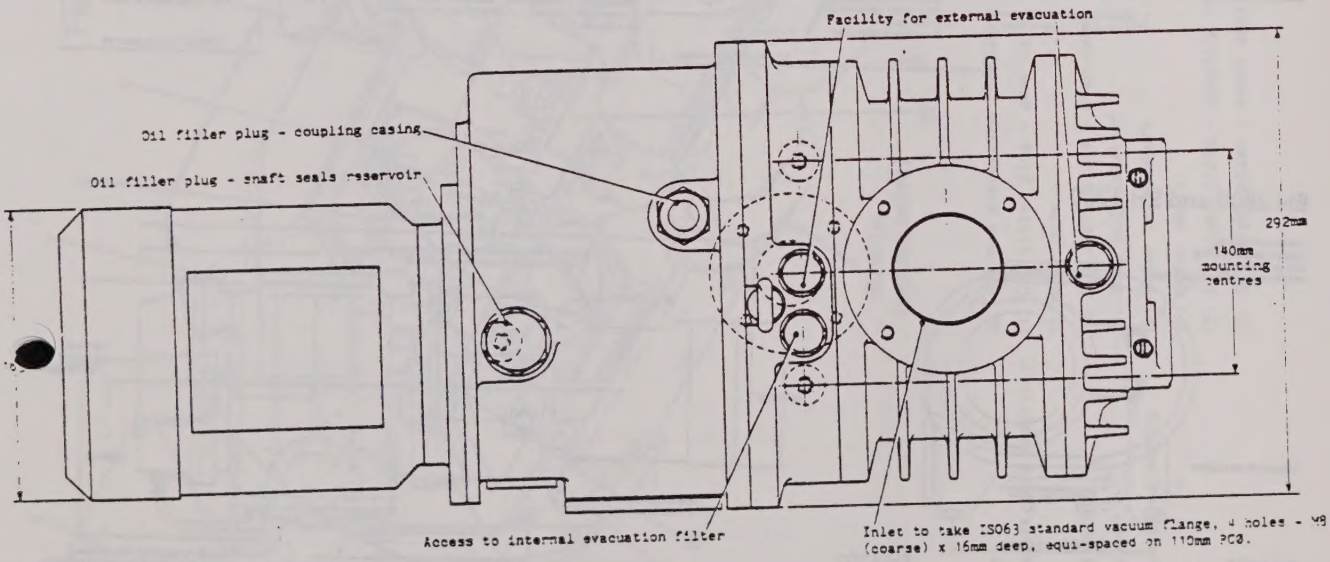
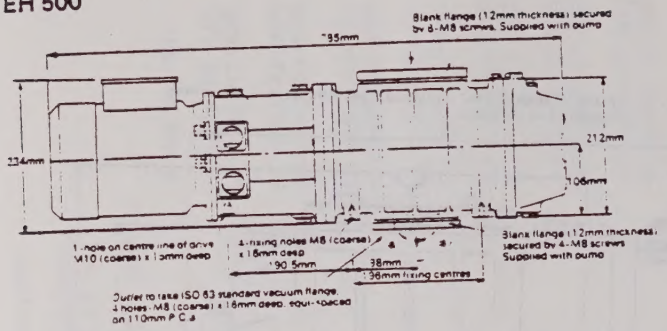
Dimensional Data - EH250

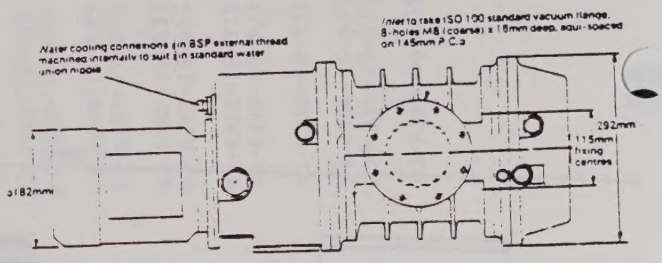

Blank flange (12mm thickness) secured by 4 - M8 screws.
Supplied with pump.
682mm
270mm
231mm
125mm
Oil sight glass - shaft seals reservoir
Oil sight glass - coupling casing
3 mounting holes - M10 (coarse) x 15mm deep.
179.5mm
98 mm
Access to internal evacuation filter
Blank flange (12mm thickness) secured by 4 - M8 screws. Supplied with pump.
Outlet to take ISO40 standard vacuum flange, 4 holes - M8 (coarse) x 15mm deep, equi-spaced on 80mm PCØ.


Facility for external evacuation
Oil filler plug - coupling casing
Oil filler plug - shaft seals reservoir
292mm
140mm mounting centres
Access to internal evacuation filter
Inlet to take ISO63 standard vacuum flange, 4 holes - M8 (coarse) x 16mm deep, equi-spaced on 110mm PCØ.

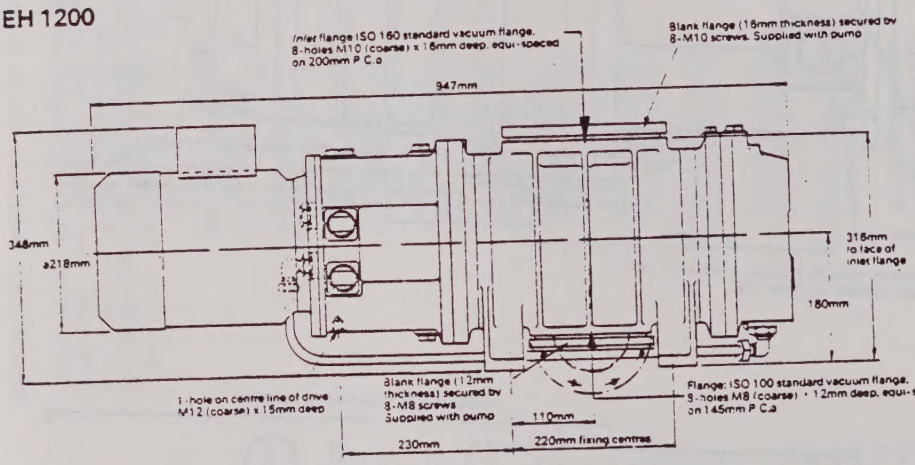
Dimensional Data

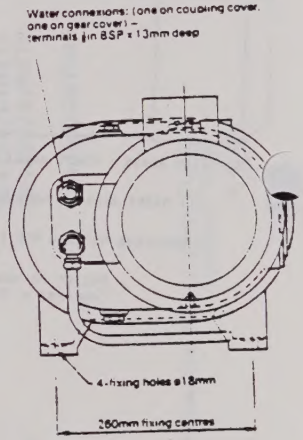
EH 500


Blank flange (12mm thickness) secured by 6-M8 screws. Supplied with pump
395mm
234mm
212mm
106mm
1-hole on centre line of drive M10 (coarse) x 13mm deep
4-fixing holes M8 (coarse) x 16mm deep
90.5mm
38mm
136mm fixing centres
Blank flange (12mm thickness) secured by 4-M8 screws Supplied with pump
Outlet to take ISO 63 standard vacuum flange, 4 holes - M8 (coarse) x 16mm deep, equi-spaced on 110mm P.C.d

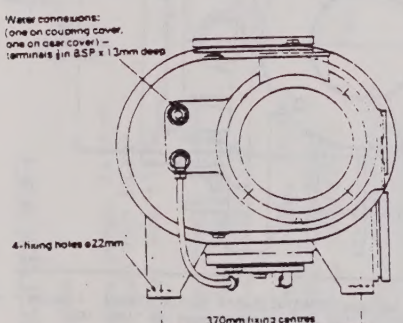

Water cooling connexions ¼in BSP external thread machined internally to suit ¼in standard water union nipple
Inlet to take ISO 100 standard vacuum flange, 8-holes M8 (coarse) x 16mm deep, equi-spaced on 145mm P.C.d
292mm
115mm fixing centres
ø182mm

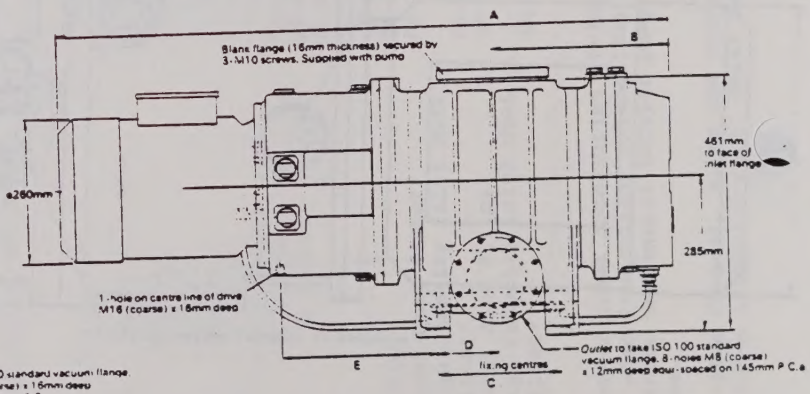
EH 1200


Inlet flange ISO 160 standard vacuum flange, 8-holes M10 (coarse) x 18mm deep, equi-spaced on 200mm P.C.d
Blank flange (16mm thickness) secured by 8-M10 screws. Supplied with pump
947mm
348mm
ø218mm
316mm to face of inlet flange
180mm
1-hole on centre line of drive M12 (coarse) x 15mm deep
Blank flange (12mm thickness) secured by 8-M8 screws Supplied with pump
110mm
230mm
220mm fixing centres
Flange: ISO 100 standard vacuum flange, 8-holes M8 (coarse) x 12mm deep, equi-spaced on 145mm P.C.d

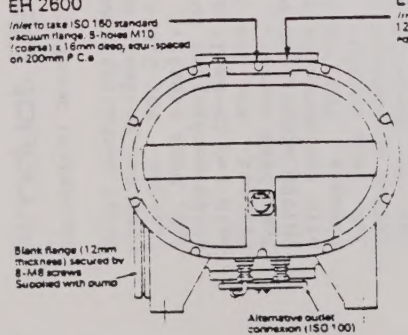

Water connexions: (one on coupling cover, one on gear cover) - terminals ¼in BSP x 13mm deep
4-fixing holes ø18mm
260mm fixing centres

EH 2600 and EH 4200


Water connexions: (one on coupling cover, one on gear cover) - terminals ¼in BSP x 13mm deep
4-fixing holes ø22mm
370mm fixing centres


A
B
Blank flange (16mm thickness) secured by 8-M10 screws. Supplied with pump
461mm to face of inlet flange
ø260mm
285mm
1-hole on centre line of drive M16 (coarse) x 16mm deep
D
E
C
fixing centres
Outlet to take ISO 100 standard vacuum flange, 8-holes M8 (coarse) x 12mm deep equi-spaced on 145mm P.C.d

EH 2600

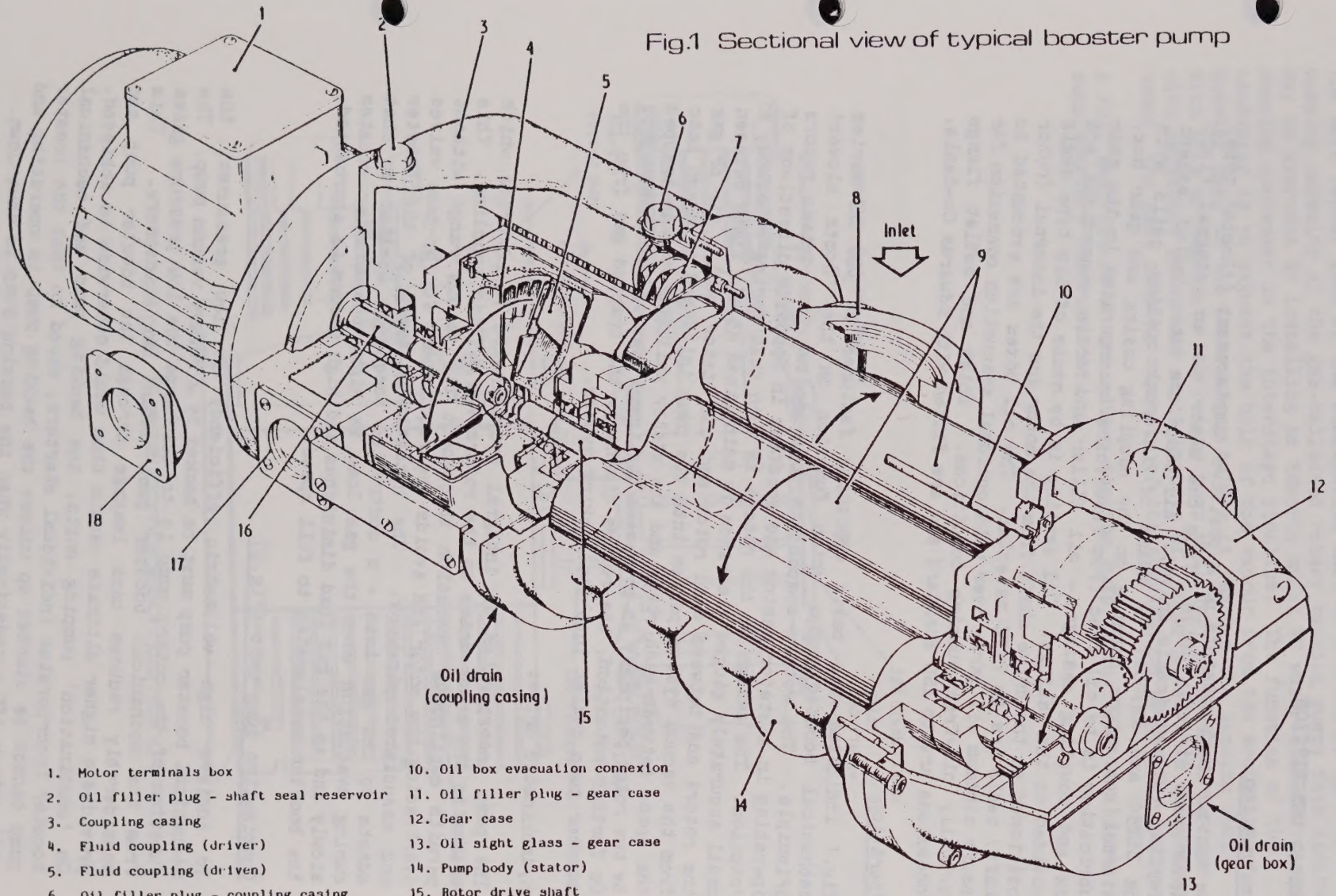

Inlet to take ISO 160 standard vacuum flange, 8-holes M10 (coarse) x 16mm deep, equi-spaced on 200mm P.C.d
Blank flange (12mm thickness) secured by 8-M8 screws Supplied with pump
Alternative outlet connexion (ISO 100)

EH 4200

Inlet to take ISO 250 standard vacuum flange, 12-holes M10 (coarse) x 15mm deep equi-spaced on 310mm P.C.d

	A	B	C	D	E
EH 2600	1093	312	220	110	275
EH 4200	1273	402	370	185	290

Fig.1 Sectional view of typical booster pump



1. Motor terminals box
2. Oil filler plug - shaft seal reservoir
3. Coupling casing
4. Fluid coupling (driver)
5. Fluid coupling (driven)
6. Oil filler plug - coupling casing
7. Cooling coil
8. Co-seal
9. Rotor(s)
10. Oil box evacuation connexion
11. Oil filler plug - gear case
12. Gear case
13. Oil sight glass - gear case
14. Pump body (stator)
15. Rotor drive shaft
16. Motor shaft
17. Oil sight glass - coupling casing
18. Oil sight glass - shaft seal reservoir

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GENERAL DESCRIPTION

Construction

The booster pump consists of a positive displacement ('Roots' type) vacuum pump directly drive from the motor via an integral fluid coupling - (hydrokinetic drive). All pumps are water cooled (except the EH250 and EH500A) by means of internal cooling coils with external connexions mounted on the coupling casing and gear box. Lubrication is by oil feed from reservoirs incorporated in the gear box and coupling casings - oil filler and drain connexions are provided on the casings. Oil sealing is by means of lip type seals positioned on the drive shaft from the motor and the internal (rotor shaft) seals are in PTFE material. The oil boxes are evacuated to ensure minimum oil carry over with optional evacuation connexion for virtually oil-free pumping conditions. Inlet and outlet flange connexions are to ISO standard and are fitted with Edwards Co-Seals.

Operation

Fig.1 indicates the basic operating features of the EH series mechanical booster pumps which function on the 'Roots blower' principle. The rotary components comprise two gear-driven rotors operating in a stator casing and rotating in opposite directions of rotation. The design of the rotors is such that during rotation, a small accurately gauged clearance is maintained at all times between the rotors and between each rotor and the stator wall. Air or gas from the vacuum system passes into the pump inlet and is drawn into the space between each rotor and the stator wall where it is trapped by the rotor periphery as it passes the inner edge of the inlet duct. On further rotoation, the rotors discharge the trapped gas from the booster pump outlet into the backing system.

Hydrokinetic drive:

The pump incorporates an integral hydrokinetic fluid drive which transmits the motor drive to the rotors via a fluid coupling. This permits continuous operation throughout the vacuum range without overloading the motor and avoids the requirement for by-pass valves and associated pipework. The rotoational speed of the booster adapts to the gas load - a controlled torque is applied so that during evacuation when the gas load is high, the booster rotates slowly and as the gas load diminishes and high vacuum is approached, the booster accelerates to full speed.

Combination pump unit (Fig.2)

To achieve high volumetric efficiency at low pressures, the mechanical booster pump must be backed by a rotary vacuum pump. The function of the rotary pump is to discharge the low pressure gases from the mechanical booster pump outlet to atmosphere. This considerably reduces back leakage through the booster pump and provides a higher ultimate vacuum than would otherwise be achieved. On 'combination' pumping units, the backing pump and mechanical booster incorporates individual starters, wired so that the booster pump cannot be started up unless the backing pump is operating and will switch off automatically when the backing pump is shut down.

The safe vapour load of the combination unit is limited by the vapour pumping capacity of the gas-ballasted rotary backing pump; this limitation may be overcome by installing an Edwards model VC water-cooled, vapour pumping condenser in the interstage pipeline. The function of the condenser is to extract the bulk of the vapour from the mechanical booster pump in the interstage, before it reaches the backing pump. With this arrangement, the rotary pump will only be required to cope with permanent gases and small amounts of vapour mixed with the gases; hence, the safe pumping capacity of the combination is greatly increased.

A full description of the rotary backing pump is included in the relevant supplementary instructions.

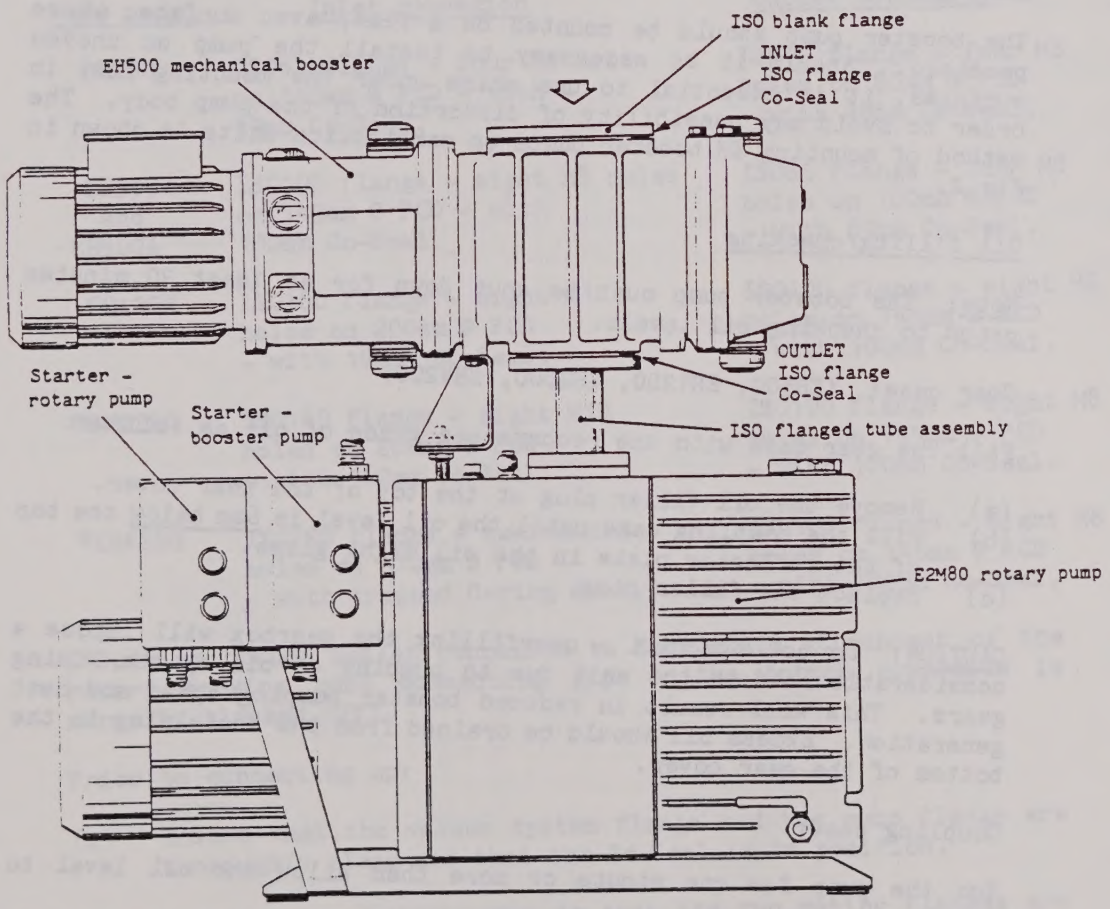

Fig.2 Typical combination pumping unit

INSTALLATION

Unpacking

On receipt of the pumping unit, remove all packaging materials and the blanks on the inlet and outlet connexions. Clean the connexion flanges on the booster pump with 'GENKLENE' or other suitable solvent. (Observe the precautions recommended when using highly volatile solvents for cleaning purposes).

Note: It is recommended that the Co-Seal elastomer is cleaned using dry cloth or paper tissue (lint free if available). Solvent should never be applied as a cleaning agent as prolonged and heavy outgassing results. If removal of solvent from an elastomer is required, light baking under rough vacuum is advised.

Mounting

The booster pump should be mounted on a flat, even surface, where possible. Should it be necessary to install the pump on uneven surfaces, it is essential to use shims under the mounting feet in order to avoid any possibility of distortion of the pump body. The method of mounting EH booster pumps on combination units is shown in Fig.2.

Oil filling/checking

Note: The booster pump must be shut down for at least 30 minutes prior to checking oil levels.

Gear case: (EH500, EH1200, EH2600, EH4200)

Fill the gear case with the recommended grade of oil as follows:

(a) Remove the oil filler plug at the top of the gear cover.
(b) Fill the coupling case until the oil level is 6mm below the top of the reflector plate in the oil sight glass.
(c) Replace the filler plug.

CAUTION: Do not overfill - overfilling the gearbox will impose a considerable load on the unit due to pumping of oil by the timing gears. This will result in reduced booster pumping speed and heat generation. Excess oil should be drained from the drain plug in the bottom of the gear cover.

Coupling case:

Run the pump for one minute or more then allow the oil level to settle
for 30 minute.s Fill the coupling case with the recommended grade of oil, as follows:

(a) Remove the oil filler plug at the top of the casing.
(b) Fill the casing until the oil level registers at the top of the reflector plate in the oil sight glass.
(c) CAUTION: Do not overfill. If necesary, drain excess oil by means of the oil drain plug at the bottom of the casing - overfilling will impose an unnecessary load on the motor and may cause the starter overload to trip out.

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Oil reservoir - shaft seal:

The coupling casing accommodates an integral oil reservoir for the shaft seal with an oil level sight glass fitted in the coupling cover. Ensure the oil level is maintained above the top of the reflector plate in the sight glass.

CAUTION: Insufficient oil or contaminated oil can result in premature shaft seal failure.

The reservoir should be filled to the bottom thread of the oil filler plug.

Vacuum connexions

Pump inlet and outlet connexions are made by means of ISO flanges and Edwards co-Seals (except the EH4200). Blank flanges and Co-seals are supplied with each pump (for details - refer to 'Dimensional Data').

Pump model	Inlet connexion	Outlet connexion
EH250	ISO63 flange - four M8 holes on 110mm Ø PCD - with 63mm Co-Seal.	ISO40 flange - four M8 holes on 80mm Ø PCD - with 40mm Co-Seal.
EH500 and -EH500A	ISO100 flange - eight M8 holes on 145mm Ø PCD - with 100mm Co-Seal.	ISO63 flange - four M8 holes on 100mm Ø PCD - with 63mm Co-Seal.
EH1200	ISO160 flange - eight M10 holes on 200mm Ø PCD - with 160mm Co-Seal.	ISO100 flange - eight M8 holes on 145mm Ø PCD - with 100mm Co-Seal.
*EH2600	ISO160 flange - eight M10 holes on 200mm Ø PCD - with 160mm Co-Seal.	ISO100 flange - eight M8 holes on 145mm Ø PCD - with 100mm Co-Seal.
*EH4200	ISO250 flange - twelve M10 holes on 310mm Ø PCD - with trapped O-ring seal.	ISO100 flange - eight M8 holes on 145mm Ø PCD - with 100mm Co-Seal.

(*Side or bottom outlet connexion to facilitate attachment of the rotary backing pump connecting pipe - the bottom connexion is normally blanked off).

Prior to connecting up:

(a) Ensure that the vacuum system flange and the pump flange are thoroughly clean and that the Co-Seal is in position.

(b) Position the booster pump so that the two mating flanges are concentric and parallel then secure the connexion by progressively tightening diametrically opposite flange bolts. Ensure that the pump body is not distorted.

Cooling water connexions (EH500, EH1200, EH12600, EH4200)

Refer to 'Technical Data', page 1 for cooling water flow rates. Connect the cooling water supply and the return to the 3/8in BSP unions on the booster pump gear box and coupling casing - the direction of water flow is not critical.

Note: If the water supply line to the booster is excessively lengthy, it is recommended that a 1/2in external ø (or larger) pipe be installed to prevent excessive pressure drop and to maintain the cooling water flow rate.

Electrical connexions

Booster pump:

Ensure the mains supply voltage corresponds with that specified on the motor data plate then connect the supply leads to the appropriate terminals in the terminal box. (Refer to instruction leaflet supplied with motor).

Combination unit:

A typical wiring diagram for the combination unit is shown in Fig.3; the circuit shown ensures that the booster cannot be started up unless the backing pump is operating and will switch off automatically when the backing pump stops.

Direction of rotation

The booster should rotate clockwise when viewed from the fan end of the motor.

Rotary backing pump

Detailed installation data is provided in the relevant supplementary instructions.

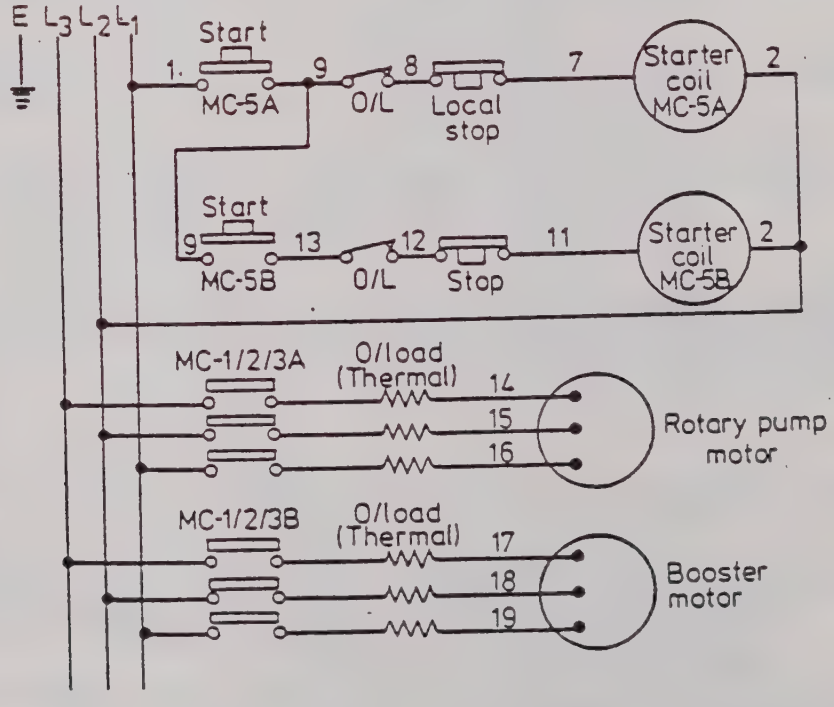

Fig.3 Combination unit-typical wiring diagram

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The following notes are also applicable to combination units:

Ensure that the following requirements are implemented prior to operating the equipment:-

(a) If the mechanical booster pump is liable to be contaminated by dust or other particles entering from the vacuum system, an inlet dust filter must be used. The Edwards IT3000 Series inlet filters and high capacity inlet dust filters have been designed primarily for use with the EH1200 and EH2600 booster pumps and the IT5000 Series filters for use with the EH2400 pumps. The IT800 series filters are recommended for the EH500 pumps and the IT300 Series for the EH250 models - see accessories, page 2 for ordering details.

(b) The gas ballast on the rotary backing pump must be opened if condensable vapours are to be pumped.

(c) Check that the oil levels on all components are satisfactory.

Starting up

Switch on the pump combination by first switching on the rotary backing pump, then switch on the mechanical booster pump.

Note: The pumps are equipped with individual starters wired so that the booster pump cannot be started before the backing pump is running and will be switched off automatically when the backing pump stops.

Combination Outfits With Starters To Be Connected As Shown

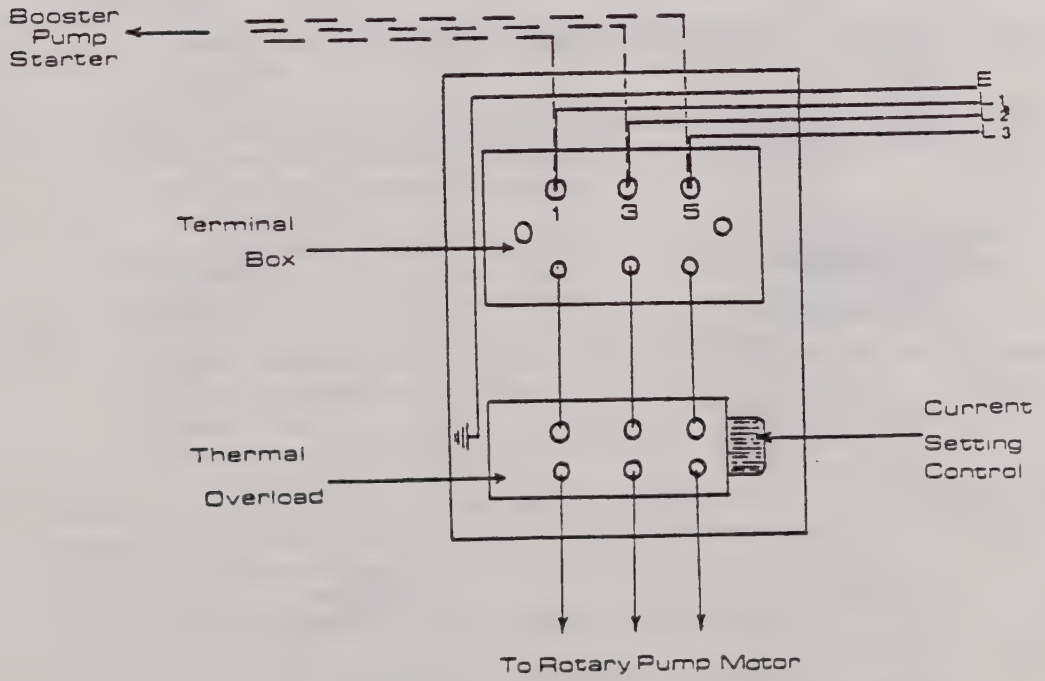


Fig.3a Mains supply connexions to starter (typical)

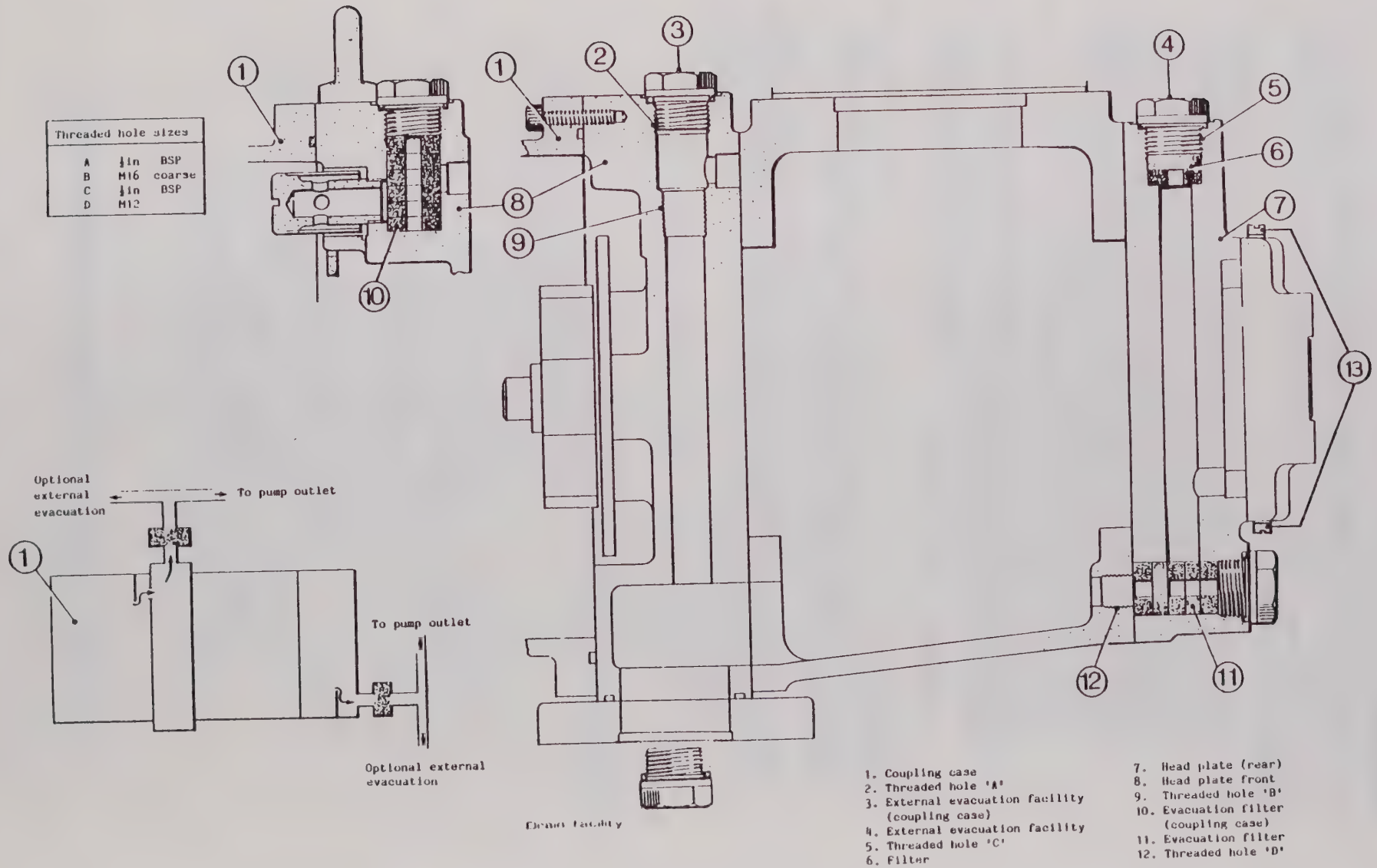


Fig.4 Evacuation of EH250 coupling case

Operating notes

(a) If the mechanical booster pump is operating and is isolated from a system at atmospheric pressure, the isolation valve must be opened slowly (from 5 to 10 seconds) t enable the booster pump to slow down gradually. Failure to observe this precaution may result in the maximum permissible pressure differential being exceeded.

(b) Pneumatically operated valves which open instantaneously on actuation should not be used if they are required to open against atmospheric pressure when the pump is operating at full speed. To avoid this condition, the booster pump starter solenoid may be adjusted so that it is energised when the evacuation valve opens. Alternatively, the solenoid may be energised by an Edwards model VSK1B vacuum actuated pressure switch which operates as soon as the backing pump lowers the chamber pressure below atmosphere.

1. Evacuation of Coupling Case/Gear Box from external source

Figs.4 and 5 show the evacuation system in schematic form. The fluid coupling and timing gear cases are connected to the outlet of the pump and thus form an integral part of the vacuum system. To prevent contamination of the lubricating oil and bearings by dust, a small felt filter is fitted in the connecting line(s). When an exceptionally clean system is required, the gear case (and coupling case - EH250) can be evacuated by connecting to the pump inlet or to an external source, as follows:

EH250-EH500A pumps (refer to Fig.4):

(a) Remove the plug from the external evacuation connection in the front head plate.

(b) Apply 'Silcoset' sealing compound to internal threaded *hole 'B' then fit a socket head set *screw in hole 'B' to seal off the internal evacuation groove.

(c) Use threaded *hole 'A' for fitting of external evacuation connexion. A filter can be included in the external evacuation line, as necessary.

(d) Repeat procedures (a), (b), (c) for threaded "holes 'C' and 'D' in the rear head plate.

*See table, Fig.4 for hole sizes.

Note: Drainage facility provided on EH500A for oil collected from evacuation operations, ¼in BSP plug is removed for draining (ref. Fig.4).

EH500, EH1200, EH2600, EH4200 pumps (refer to Fig.5)

(a) Remove the blanking plug from the head plate.

(b) Apply 'Silcoset' sealing compound to internal threaded *hole 'B' then fit a socket head set *screw in hole 'B' to seal off the internal evacuation groove.

(c) Use threaded *hole 'A' for fitting of external evacuation connexion. A filter can be included in the external evacuation line as necessary.

Note: With the evacuation line connected to the pump inlet, the pressure in the end cases will be lower than the average pressure in the stator, thus providing a positive pressure gradient which will ensure virtually oil-free pumping conditions.

*Size specified in table, Fig.5.

2. Quick Pump-down

Where a rapid pump-down is required, the felt filter can be removed provided that the application is clean. On dusty applications for which rapid pump-down is also required, the small felt filter can be replaced by a larger in-line filter connected to the external evacuation port as described in para. 1 (a), (b), (c) and (d) and shown in Figs.4 and 5.

MAINTENANCE

The following procedure applies to the booster pump. Detailed maintenance procedure for the rotary backing pump is provided in the relevant supplementary instructions.

Routine checks

Maintain the shaft seal oil reservoir at the correct level. Use the recommended grade of oil for topping up and replenishing. (Refer to 'INSTALLATION' for detailed procedure).

Rear bearing lubrication (EH250-EH500A series only)

4 x 1/8in plugs are located on the rear and cover to provide a manual lubrication facility to the rear bearings. It is recommended that under normal running conditions that lubrication is carried out at six monthly intervals, if the pump is used under arduous conditions then the frequency of lubrication must be increased.

CAUTION

Before any lubrication takes place the applicator must be thoroughly clean and used only for Fomblin VA3 grease.

Sequence of lubrication

1. Pump must be vented up to atmosphere and stopped before lubrication can take place.

2. Using a correct sized broad-bladed screwdriver remove the top and bottom left hand plugs complete with their O-rings, (left hand viewed as looking at rear plate towards motor).

3. Screw the grease nipple, one supplied, into the bottom plug hole and with the correct size spanner gently tighten.

4. Attach greasing applicator to nipple and proceed with lubrication until grease is visible at the top hole.

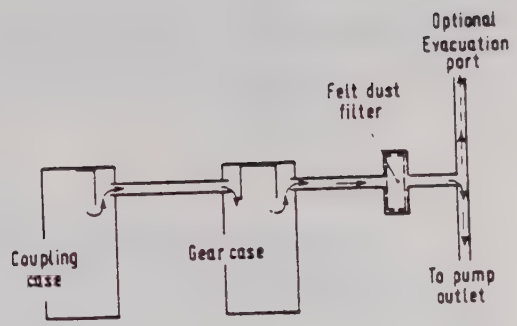
5. Remove applicator and grease nipple, replace and tighten bottom then top plugs making sure their respective O-rings are in place.

6. Continue with the right hand side as for the left.

7. On completion of lubrication wipe off any excess grease from plug areas.

Spares	Ordering number
YVAC3 Fomblin vacuum grease (25g)	09-H113-51-001
Grease nipple 1/8in BSP	A24601003
O-ring (Viton)	A26002009

Model	Thread 'A'	Thread 'B'
EH 500	1/4" B.S.P.	M10 (coarse)
EH 1200	1/4" B.S.P.	M10 (coarse)
EH 2600	1/2" B.S.P.	M16 (coarse)
EH 4200	1/2" B.S.P.	M16 (coarse)



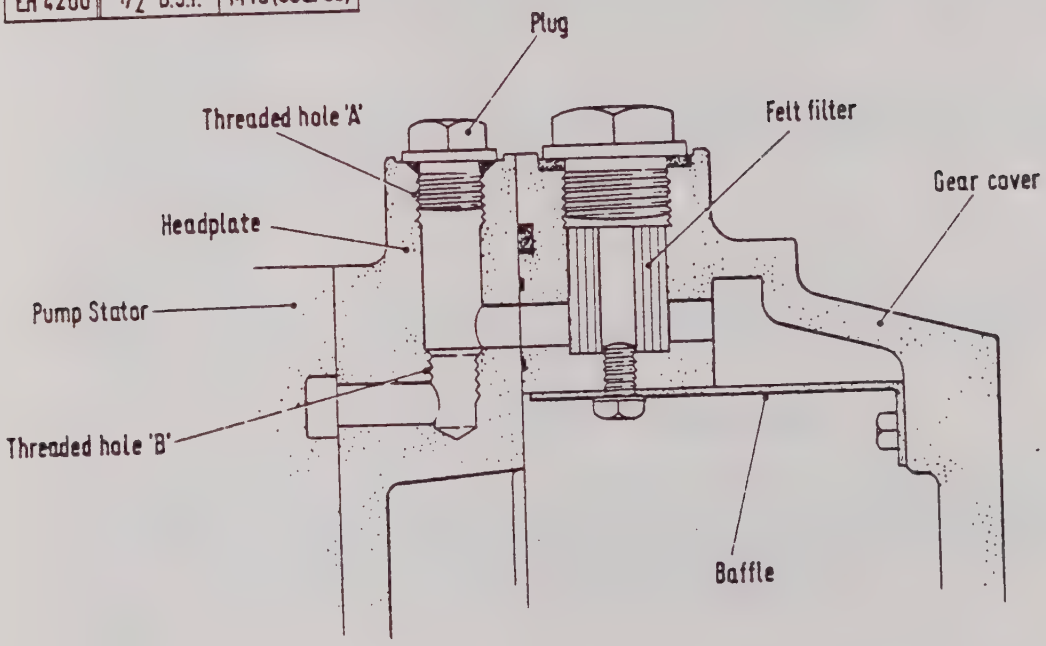


Fig. 5 Evacuation of gear box/coupling case

Note: Before filling the gear box or coupling casing with oil, ensure that the mechanical booster is stationary and at atmospheric pressure for at least 30 minutes.

(a) Check the oil level in the gear box, and in the coupling casing -replenish with the recommended grade of oil if necessary. Refer to 'INSTALLATION', for detailed procedure.

Evacuation line filter (Figs.4 and 5)

The felt filter in the evacuation line connexion in the gear case (and coupling case (EH250) will only require occasional inspection and should be renewed if excessively contaminated.

Renewal of drive shaft oil seals

If the drive shaft seals are defective, it will be indicated by excessive oil leakage and frequent replenishing of the seal reservoir. To renew the seal(s), proceed as follows:-

Dismantling (Refer to Figs. 1 and 6)

(a) Disconnect the electrical supply to the motor. Disconnect the cooling water supply and return pipelines at the connexions on the gear box and the coupling case (except EH250).

(b) Drain the oil from the coupling casing by means of the drain plug at the bottom of the casing. Unscrew and remove the seal reservoir filler plug then drain off the oil in the seal reservoir.

(c) Remove the cover plate (item 7, Fig.6) and gasket from the coupling casing to gain access to the coupling enclosure. Remove the retaining screws (item 8, Fig.6) from the periphery of the coupling enclosure.

Note: To release the enclosure - carefully insert a sharp screwdriver blade between the shoulder of the coupling and the enclosure then twist the blade to detach the enclosure.

(d) Remove the socket screws retaining the coupling casing to the pump head plate then carefully detach and withdraw the coupling casing and motor assembly from the head plate. Use suitable lifting tackle to position this assembly, as necessary.

(e) Remove the socket screw retaining the coupling driver to the motor shaft then remove the inner thrust ring. Carefully withdraw the coupling driver and the outer thrust ring from the shaft, utilizing the threaded extraction holes if the coupling is tight on the shaft. Remove the key from the shaft.

(f) Remove the screws and washers retaining the motor to the coupling casing then carefully withdraw the motor and shaft from the casing. Note: Do not remove the inner rings from the motor shaft.

(g) Remove the countersunk screws from both the inner and outer seal retainers then detach the retainers. Remove the outer seal (Spiroseal) from the seal housing then carefully withdraw the two inner seals complete with the back-up washers.

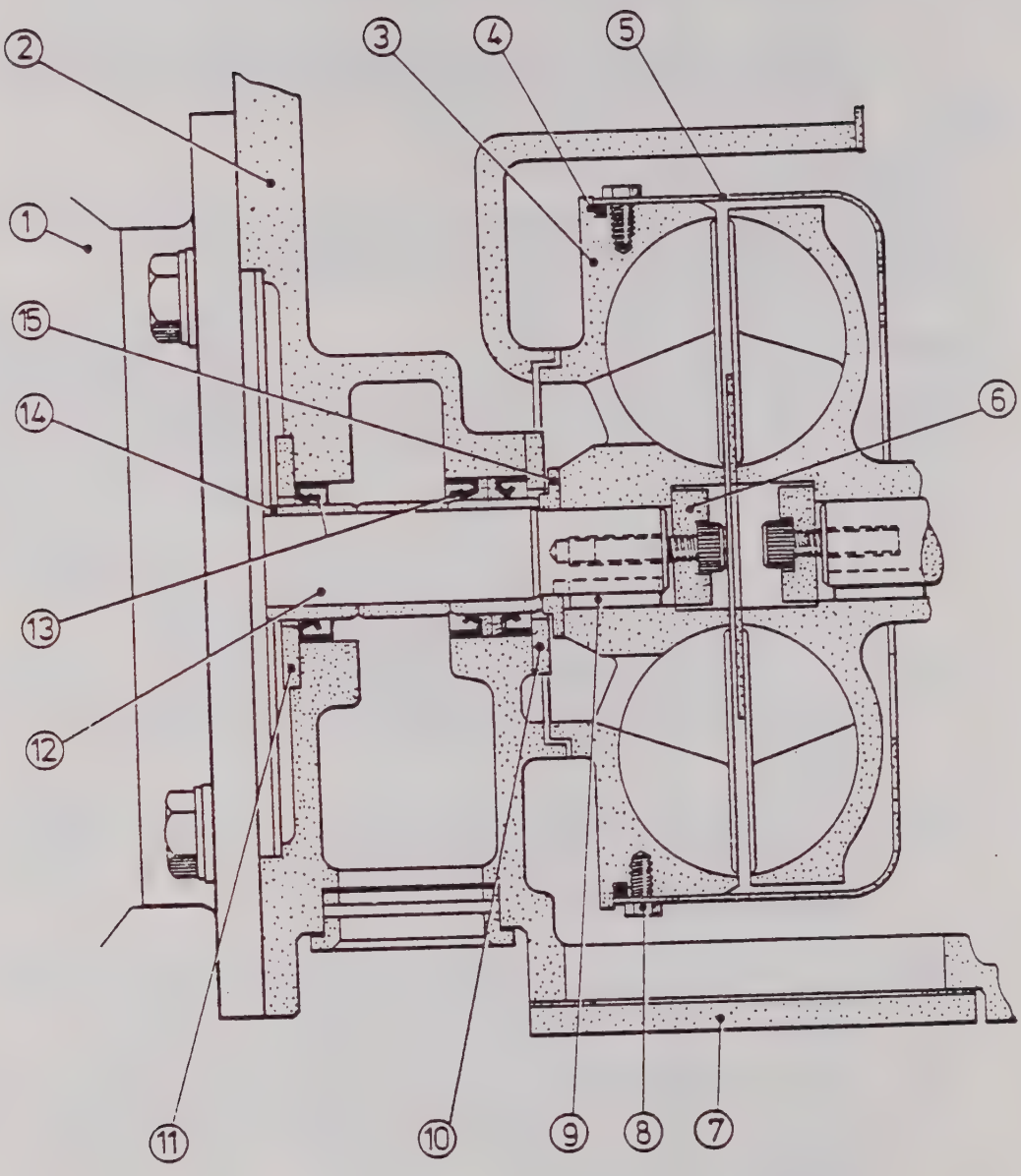


Fig.6 Assembly of drive shaft oil seals

1. Motor
2. Coupling casing
3. Coupling driver
4. O ring
5. Coupling enclosure
6. Inner thrust ring
7. Cover plate
8. Retaining screws (coupling enclosure)
9. Key
10. Inner retainer
11. Outer retainer
12. Drive shaft
13. Oil seal(s)
14. Inner ring
15. Outer thrust ring

Re-assembly:

Note: Ensure all parts and particularly mating assembly faces are thoroughly clean and free from oil. Refit to 'Parts List' for details of replacement items.

(a) Fit replacement oil seals in the seal housing bores, as shown, Fig.6 -

(i) Lightly lubricate the sealing lips of the oil seals prior to assembly then press home in the seal housing unit flush with the machined faces. Assemble the two inner seals either side of the back-up washers.

(ii) Fit the seal retainers - apply Loctite SCREWLOCK to the threads of the countersunk screws prior to assembly (ensure the threads are clean and free of oil) - secure the retainers with the screws.

(b) Assemble the motor to the coupling casing - cover the sharp edges of the motor shaft with a suitable adhesive tape to protect the seals during assembly - then carefully insert the motor shaft in the seal housing and secure the motor with the screws and lock-washers. Remove the protective tape from the motor shaft.

(c) Assemble the coupling driver to the motor shaft -

(i) Fit the outer thrust ring then fit the key on the shaft and assemble the coupling driver.

(ii) Apply Loctite SCREWLOCK to the threads of the retaining screw - ensure the threads are clean and free of oil - then fit the inner thrust ring and secure the coupling driver to the shaft with the screw.

(d) Assemble the coupling casing and motor assembly to the pump head plate - use suitable lifting tackle to position this assembly.

(i) Examine the joint face O-ring seal and the coupling enclosure O-ring - renew if damaged or deteriorated.

(ii) Assemble the coupling casing to the head plate, aligning the coupling enclosure with the coupling driver - fit the casing retaining screws and tighten evenly in sequence.

(iii) Lightly grease the periphery of the coupling driver and the O-ring with high vacuum grade grease. Mark the location of one of the threaded holes then align the screw hole in the coupling enclosure with the corresponding threaded hole in the driver. Press home the coupling enclosure over the O-ring on the coupling driver - assembly will be facilitated by inserting a screwdriver through the inspection port and levering at the rear of the shroud.

(iv) Ensure the threads of the coupling enclosure retaining screws are clean and free from grease then apply Loctite SCREWLOCK to the threads.

(v) Secure the coupling enclosure to the driver with the retaining screws then fit the cover plate and the gasket to the coupling casing.

(e) Fit the coupling casing oil drain plug then fill the coupling casing and the shaft seal reservoir with clean, fresh oil as detailed in 'INSTALLATION'.

Reconnect the cooling water pipelines to the connexions on the gear box and the coupling casing.

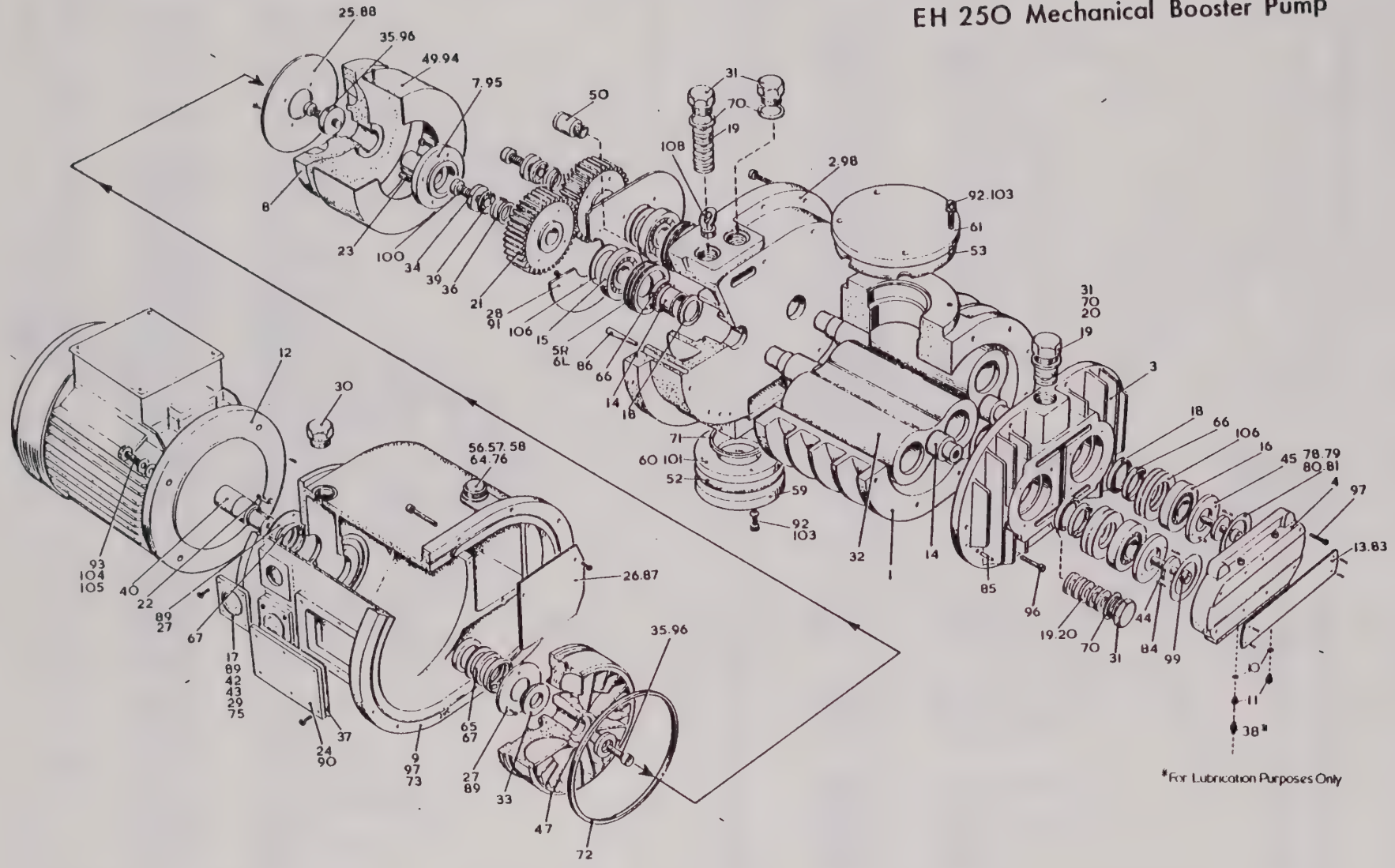
Booster pump gear box

Further dismantling or maintenance should not be necessary; however, if after lengthy service, the rotor bearings or timing gears become excessively worn, the pump should be returned for servicing and repair. It is recommended that this work is undertaken by Edwards Service Engineers or by other skilled personnel only if service engineers are not available.

Electric motor

Refer to manufacturer's leaflet supplied with motor for maintenance requirements.

EH 250 Mechanical Booster Pump



*For Lubrication Purposes Only

03-A301-51-883

19/23

EH250 Mechanical Booster Pump - Parts List

Item	Code No.	Description	Quantity
1	A30151001	Stator	1
2	A30151002	Headplate (Front)	1
3	A30151003	Headplate (Rear)	1
4	A30151004	End Cover	1
5	A30151005	Oil Thrower (Right Hand)	1
6	A30151006	Oil Thrower (Left Hand)	1
7	A30151007	Coupling Shaft	1
8	A30151008	Fluid Coupling (Driven)	1
9	A30151009	Coupling Cover	4
10	H02122009	'O' Ring	4
11	A26002009	Plug 3/8 BSP	1
12		Motor	1
13	A20001007	Label	4
14	A20405001	Inner Ring	2
15	A20403009	Ball Bearing - 6304 RS	2
16	A20403010	Ball Bearing - 6304Z	2
17	A20416001	Sight Glass Bezel	4
18	A22302005	Dust Seal	11
19	A22302015	Filter	2
20	A22302016	Filter	1 Pair
21	A22903010	Gears	1
22	A24301005	Key	1
23	A24301014	Key	1
24	A25942001	Cover Plate	1
25	A25970007	Coupling Baffle	1
26	A25970008	Oil Reservoir Cover	2
27	A25971002	Seal Retainer	1
28	A25971016	Bearing Retainer	2
29	A25976001	Sight Glass Reflector.	1
30	A26002002	Plug - 1in BSP (with vent hole)	4
31	A26002003	Plug 1/2in BSP	2
32	A26401045	Rotor	1
33	A26407002	Thrust Ring	2
34	A26407003	Thrust Ring	2
35	A26407004	Thrust Ring	2 Pairs
36	A26440001	Locking Element	1
37	A27159500	Gasket	1
**38	A24601003	Nipple 3/8 BSP	2
39	A27801001	Clamp Ring	2
40	A27801006	Sleeve (Soft)	
41			2
42	A27820008	Compression Ring	2
43	A29201004	Sight Glass	2
44	A26407011	Thrust Ring	2
45	A26407012	Spacer	
46			1
47	A30251006	Fluid Coupling (Driver)	
48			1
*49		Coupling Enclosure	1
50	A30251021	Baffle Assembly	
51			1
52	B27158057	Co Seal 40mm	1
53	B27158063	Co Seal 63mm	
54			

*A301-51-010 (220/240V, 280/415V outfits)
*A301-52-001 (230/460V outfits)

**EH250 model only
(For lubrication purposes)

Item	Code No	Description	Quantity
55			
56	C03400005	Union Nut	2
57	C03400007	Union Body	2
58	C03400011	Tailpiece	2
59	C10005040	ISO 40 Blank Flange	1
60	C10005099	Flange	1
61	C10007040	Blanking Flange 63mm	1
62			
63			
64	H02104004	Bonded Seal	2
65	H02109047	Back-up Washer	2
66	H02109052	Oil Seal	4
67	H02109065	Oil Seal DPSM 25-35-7 (Viton)	3
68			
69			
70	H02120061	'O' Ring	4
71	H02120077	'O' Ring	1
72	H02120099	'O' Ring	1
73	H02120112	'O' Ring	1
74			
75	H02125028	'O' Ring	4
76	H02125121	'O' Ring	2
77			
78	A27165008	Shim - 0.20 mm Thick	AS REQD.
79	A27165009	Shim - 0.25 mm Thick	AS REQD.
80	A27165010	Shim - 0.35 mm Thick	AS REQD.
81	A27165011	Shim - 0.40 mm Thick	AS REQD.
82			
83	211430301,	Rivet	4
84	212170029	Spring Pin	4
85	212192016	Taper Pin	2
86	212192026	Taper Pin	2
87	218002328	Screw M5 x 10	3
88	218032288	Screw M4 x 10	4
89	218032328	Screw M5 x 10	14
90	218032330	Screw M5 x 16	6
91	218032369	Screw M6 x 12	8
92	218072413	Screw M8 x 30	8
93	218072452	Screw M10 x 25	4
94	218042287	Screw M4 x 8	6
95	218091370	Screw M6 x 16	4
96	218091371	Screw M6 x 20	12
97	218091372	Screw M6 x 25	17
98	218091375	Screw M6 x 40	9
99	218091412	Screw M8 x 25	2
100	218091452	Screw M10 x 25	2
101	218091411	Screw M8 x 20	4
102			
103	218980210	Washer M8	8
104	218980211	Washer M10	4
105	218984011	Shakeproof Washer M10	4
106	218984728	Pre-Load Waved Washer	8
107			
108	218790005	Eyebolt	1

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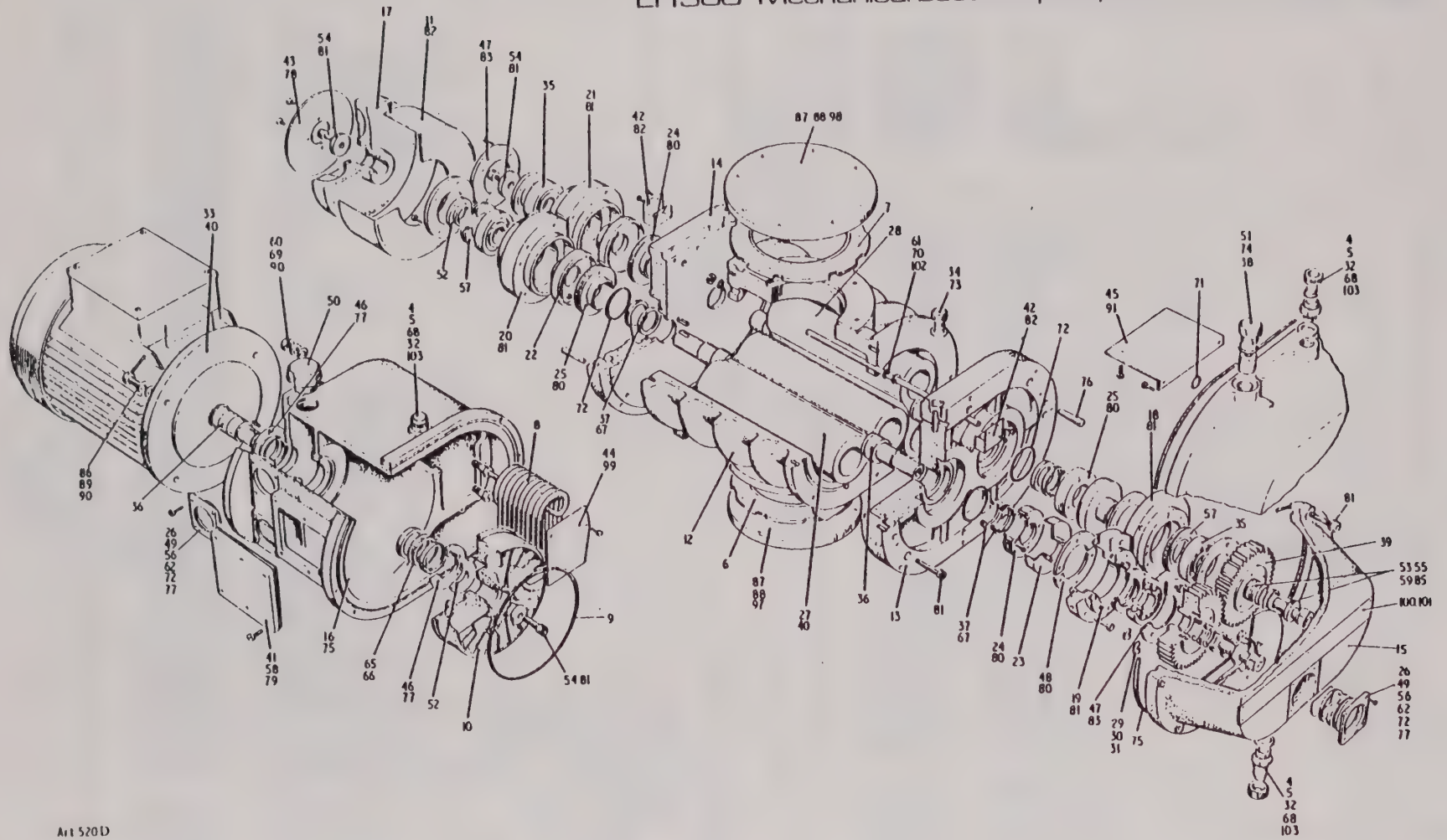
EH500 Mechanical booster pump



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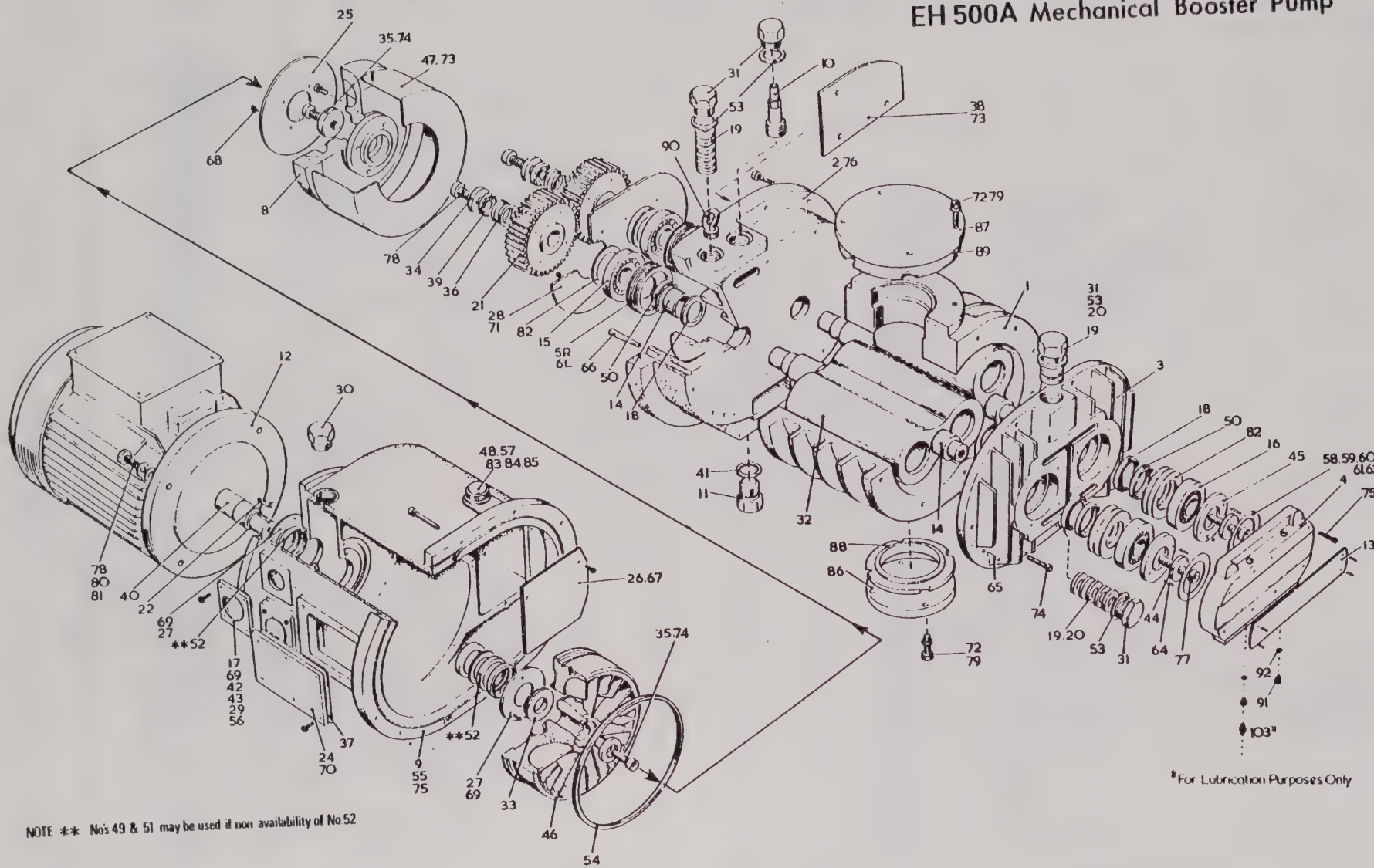
EH500 Mechanical booster pump -Parts list

Item	Code No.	Description	Quantity
1	-	-	-
2	-	-	-
3	-	-	-
4	C03400007	Vacuum Union Alternative Body	4
5	C03400011	Vacuum Union Blind Tailpiece	4
6	B27150063	63mm Co-Seal	1
7	B27150070	100mm Co-Seal	1
8	A30251010	Cooling Coil	1
9		O-ring	1
10	A30251006	Fluid Coupling - Driver Half	1
11	A30251009	Coupling Enclosure	1
12	A30251001	Stator	1
13	A30251002	Headplate - Gear End	1
14	A30251003	Headplate - Coupling End	1
15	A30251004	Gear Cover	1
16	A30251005	Coupling Cover	1
17	A30251007	Fluid Coupling - Driven Half	1
18	A30251011	Bearing Carrier - RH Gear End	1
19	A30251012	Bearing Carrier - LH Gear End	1
20	A30251013	Bearing Carrier - RH Coupling End	1
21	A30251014	Bearing Carrier - LH Coupling End	1
22	A30251015	Throw Ring - Coupling End	2
23	A30251016	Throw Ring - Gear End	2
24	A30251017	Seal Carrier - LH	2
25	A30251018	Seal Carrier - RH	2
26	A30251019	Sight Glass Bezel	3
27	A26401016	Rotor - Driver	1
28	A26401017	Rotor - Driven	1
29	A27165001	Shim - 0.05mm thickness	As required
30	A27165002	Shim - 0.10mm thickness	As required
31	A27165003	Shim - 0.25mm thickness	As required
32	C03400005	Union Nut	4
33	A07112003	Motor	1
34	A09800087	Plug	1
35	A20403006	Ball Bearing	4
36	A20405001	Inner Ring	7
37	A22302005	Dust Seal	4
38	A22302006	Filter	1
39	A22903004	Gears	1 pair
40	A24301005	Key	2
41	A25942001	Cover Plate	1
42	A25970020	Evacuation Baffle	2
43	A25970007	Coupling Baffle	1
44	A25970008	Oil Reservoir Cover	1
45	A25970009	Gear Cover Baffle	1
46	A25971002	Seal Retainer	2
47	A25971003	Bearing Retainer	4
48	A25971004	Retainer (2 halves)	2
49	A25976001	Sight Glass Reflector	3
50	A26002002	Plug	1
51	A26002003	Plug	1
52	A26407002	Thrust Ring	2
53	A26407003	Thrust Ring	2
54	A26407004	Thrust Ring	3
55	A26440001	Locking Element - Ringfeder	4 pairs
56	A26501011	Seal	3
57	218985235	Disc Spring	12
58	A27159500	Gasket	1
59	A27801001	Clamp Ring	2
60	A27802002	Spacer	2
61	A27804001	Evacuation Tube	1
62	A29201004	Sight Glass	3
63	-	-	-
64	A25970017	Oil Splasher	1
65	H02109046	Spiroseal	3
66	H02109047	Back-Up Washer	2
67	H02109052	Seal	4
68	H02105121	O-ring	4
69	H02120016	O-ring	2
70	H02120031	O-ring	2
71	H02120011	O-ring	1
72	H02120023	O-ring	7
73	H02120034	O-ring	1
74	H02120061	O-ring	1
75	H02120112	O-ring	2
76	212191043	Taper Pin	4
77	218032328	Screw	18
78	218032288	Screw	4
79	218032330	Screw	6
80	218091288	Screw	28
81	218091372	Screw	52
82	218002286	Screw	10
83	218002329	Screw	16
84	218002368	Screw	4
85	218031452	Screw	2
86	218072452	Screw	4
87	218072413	Screw	12
88	218980210	Washer	12
89	218980211	Washer	4
90	218984011	Washer	4
91	218980209	Washer	4
92	M01500009	Locknut	2
93	-	-	-
94	-	-	-
95	-	-	-
96	-	-	-
97	C10007040	Blanking Flange - ISO63	1
98	C10009040	Blanking Flange - ISO100	1
99	218002328	Screw	6
100	A20001059	Label	1
101	A09402040	Rivet	6
102	A26406001	Spacer	2
103	H02104004	Seal	4

MO3978A

EH 500A Mechanical Booster Pump



*For Lubrication Purposes Only

NOTE: ** Nos 49 & 51 may be used if non availability of No 52

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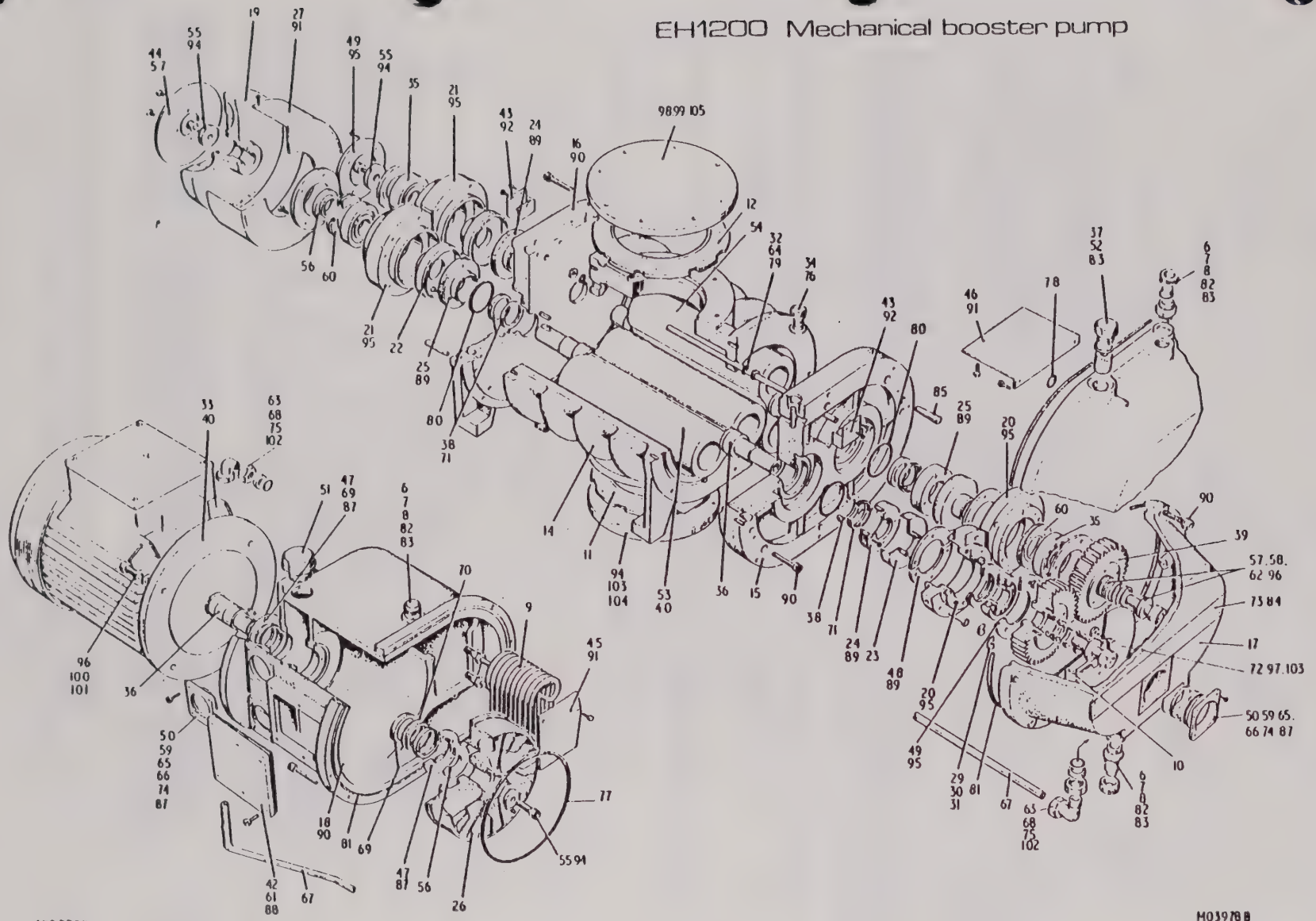
EH500A Mechanical booster pump–Parts list

ITEM	CODE NO.	DESCRIPTION	QUANTITY
1	A30271001	Stator	1
2	A30271002	Headplate (front)	1
3	A30271006	Headplate (rear)	1
4	A30271004	End cover	1
5	A30151005	Oil thrower (right hand)	1
6	A30151006	Oil thrower (right hand)	1
7	-	-	-
8	A30271007	Fluid coupling (driven)	1
9	A30151009	Coupling cover	1
10	A30151011	Evacuation adaptor	1
11	A26002018	Plug ¼in BSP	1
12	-	Motor (see label)	1
13	A20001096	Label	1
14	A20405001	Inner ring	4
15	A20403009	Bearing	2
16	A20402010	Bearing	2
17	A29416001	Sight glass bezel	2
18	A22302005	Dust seal	4
19	A22302015	Filter	11
20	A22302016	Filter	2
21	A22903013	Gears	1pr
22	A24301005	Key	1
23	-	-	-
24	A25942001	Cover plate	1
25	A25970007	Coupling baffle	1
26	A25970008	Oil reservoir cover	1
27	A25971002	Seal retainer	2
28	A25971016	Bearing retainer	1
29	A25976001	Sight glass reflector	2
30	A26002023	Plug 1in BSP	1
31	A26002021	Plug ¼in BSP	4
32	A26401063	Rotor	2
33	A26407002	Thrust ring	1
34	A26407003	Thrust ring	2
35	A26407004	Thrust ring	2
36	A26440001	Locking element (ring feeder)	2pr
37	A27159500	Gasket	1
38	A25970056	Baffle plate	1
39	A27801001	Clamp ring	2
40	A27801006	Sleeve (soft)	2
41	H02104002	Rubber bonded seal ¼in BSP	1
42	A27820008	Compression ring	2
43	A29201004	Sight glass	2
44	A26407011	Thrust ring	2
45	A26407015	Spacer	2
46	A30251006	Fluid coupling (driver)	1
47	A30154001	Coupling enclosure (60Hz Fomblin)	1
	A30152001	Coupling enclosure (60Hz)	1
	A30252002	Coupling enclosure (50Hz Fomblin)	1
	A30151010	Coupling enclosure (50Hz)	1
48	H02104004	Seal ¼in BSP	2
49	H02109047	Washer	2

ITEM	CODE NO.	DESCRIPTION	QUANTITY
50	H02109052	T.F.E. lipseal	4
51	H02109065	'Spiroseal' (Viton)	3
52	H02109075	'Simrit' seal	3
53	H02120061	O-ring	4
54	H02120099	O-ring	1
55	H02120112	O-ring	1
56	H02125028	O-ring	4
57	H02125121	O-ring	2
58	A27165008	Shim 0.20mm thick	As required
59	A27165009	Shim 0.25mm thick	As required
60	A27165010	Shim 0.35mm thick	As required
61	A27165011	Shim 0.40mm thick	As required
62	A27165018	Shim 0.3mm thick	As required
63	211430301	Rivet ('Chobert')	4
64	211174033	Spring pin	2
65	212192016	Taper pin	2
66	212192026	Taper pin	2
67	218002328	Screw M5	3
68	218032288	Screw M4	4
69	218032328	Screw M5	14
70	218032330	Screw M5	6
71	218032369	Screw M6	8
72	218072413	Screw M8	12
73	218042287	Screw M4	9
74	218091371	Screw M6	11
75	218091372	Screw M6	17
76	218091375	Screw M6	13
77	218091412	Screw M8	2
78	218091452	Screw M10	6
79	218980210	Washer M8	12
80	218980211	Washer M10	4
81	218984011	Washer M10	4
82	218984728	Washer	8
83	C03400005	Union nut ¼in	2
84	C03400007	Union alternative body ¼in	2
85	C03400011	Union blind tailpiece	2
86	C10007040	Blanking flange	1
87	C10009040	Blanking flange	1
88	B27158063	'Co-seal' assembly 63mm	1
89	B27158070	'Co-seal' assembly 1000mm	1
90	218790005	Eyebolt M12	2
91	A26002009	Plug 1/8in BSP	4
92	H02121009	O-ring (Viton)	4
*100	A24601003	Nipple 3/8in BSP	1

*LUBRICATING PURPOSES ONLY

EH1200 Mechanical booster pump



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EH1200 Mechanical booster pump -Parts list

Item	Code No.	Description	Quantity
1			
2			
3			
4			
5			4
6	C03400007	Alternative Body	4
7	C03400011	Blind Tailpiece	4
8	C03400005	Union Nut	1
9	A30551010	Cooling Coil, Coupling Cover	1
10	A30551011	Cooling Coil, Gear Cover	1
11	B27158070	100mm Co-Seal Assembly Pack	1
12	B27158074	160mm Co-Seal	
13			1
14	A30551001	Stator	1
15	A30551002	Headplate - Gear End	1
16	A30551003	Headplate - Coupling End	1
17	A30551004	Gear Cover	1
18	A30551005	Coupling Cover	1
19	A30551007	Fluid Coupling - Driven Half	2
20	A30551016	Bearing Carrier - Gear End	2
21	A30551017	Bearing Carrier - Coupling End	2
22	A30551018	Throw Ring - Coupling End	2
23	A30551019	Throw Ring - Gear End	2
24	A30551020	Seal Carrier - Left Hand	2
25	A30551021	Seal Carrier - Right Hand	1
26	A30551006	Fluid Coupling - Driver	1
27	A30551009	Coupling Enclosure	
28			As required
29	A27165001	Shim - 0.05mm thickness	As required
30	A27165002	Shim - 0.10mm thickness	As required
31	A27165003	Shim - 0.25mm thickness	2
32	A26406001	Spacer	1
33	A07114001	Motor	1
34	A09800087	Plug - ¼in BSP	4
35	A20403007	Ball Bearing	7
36	A20405002	Inner Ring	1
37	A22302007	Filter	4
38	A22302008	Dust Seal	1 pair
39	A22903005	Gears	2
40	A24301006	Key	
41			1
42	A25942002	Cover Plate	2
43	A25970021	Evacuation Baffle	1
44	A25970010	Coupling Baffle	1
45	A25970011	Oil Reservoir Cover	1
46	A25970012	Gear Cover Baffle	2
47	A25971005	Seal Retainer	2
48	A25971006	Retainer (2 halves)	4
49	A25971007	Bearing Retainer	3
50	A25976001	Sight Glass Reflector	1
51	A26002002	Plug - 1in BSP	1
52	A26002003	Plug - ½in BSP	1
53	A26401018	Rotor - Driver	

ART 5530

Item	Code No.	Description	Quantity
54	A26401019	Rotor-Driven	1
55	A26407005	Thrust Ring	3
56	A26407006	Thrust Ring	2
57	A26407007	Thrust Ring	2
58	A26440002	Locking Element - Ringfeder	4 pairs
59	A26501011	Sight Glass Rubber	3
60	218985236	Disc Spring	12
61	A27159501	Gasket	1
62	A27801002	Clamp Ring	2
63	A27802003	Cooling Coil Spacer	4
64	A27804002	Evacuation Tube	1
65	A29201004	Sight Glass	3
66	A30251019	Sight Glass Bezel	3
67	A27843011	Tube	1
68	H03505111	Stud Elbow	2
69	H02109048	'Spiroseal'	3
70	H02109049	Back-Up Washer	2
71	H02109053	Lipseal	4
72	A25970018	Oil Splasher	1
73	A20001060	Label	1
74	H02120023	O-Ring	3
75	H02125260	O-Ring	4
76	H02120034	O-Ring	1
77	H02120104	O-Ring	1
78	H02120011	O-Ring	1
79	H02120031	O-Ring	2
80	H02120051	O-Ring	4
81	H02120159	O-Ring	2
82	H02105121	O-Ring	4
83	H02104004	Bonded Seal	5
84	A09402040	Rivet	6
85	212191043	Taper Pin	4
86			
87	218032328	Screw M5 x 10mm	21
88	218032330	Screw M5 x 16mm	8
89	218091208	Screw M4 x 10mm	28
90	218091412	Screw M8 x 25mm	40
91	218002328	Screw M5 x 10mm	13
92	218002206	Screw M4 x 6mm	6
93	218002368	Screw M6 x 10mm	1
94	218072413	Screw M8 x 30mm	11
95	218002371	Screw M6 x 20mm	32
96	218072493	Screw M12 x 30mm	6
97	218072409	Screw M8 x 12mm	4
98	218072454	Screw M10 x 35mm	8
99	218980211	Plain Washer M10	8
100	218980212	Plain Washer M12	4
101	218984012	Shakeproof Washer M12	4
102	M01500011	Locknut ¾in BSP	4
103	218980210	Plain Washer M8	12
104	C10009040	Blanking Flange ISO100	1
105	C10011040	Blanking Flange ISO160	1

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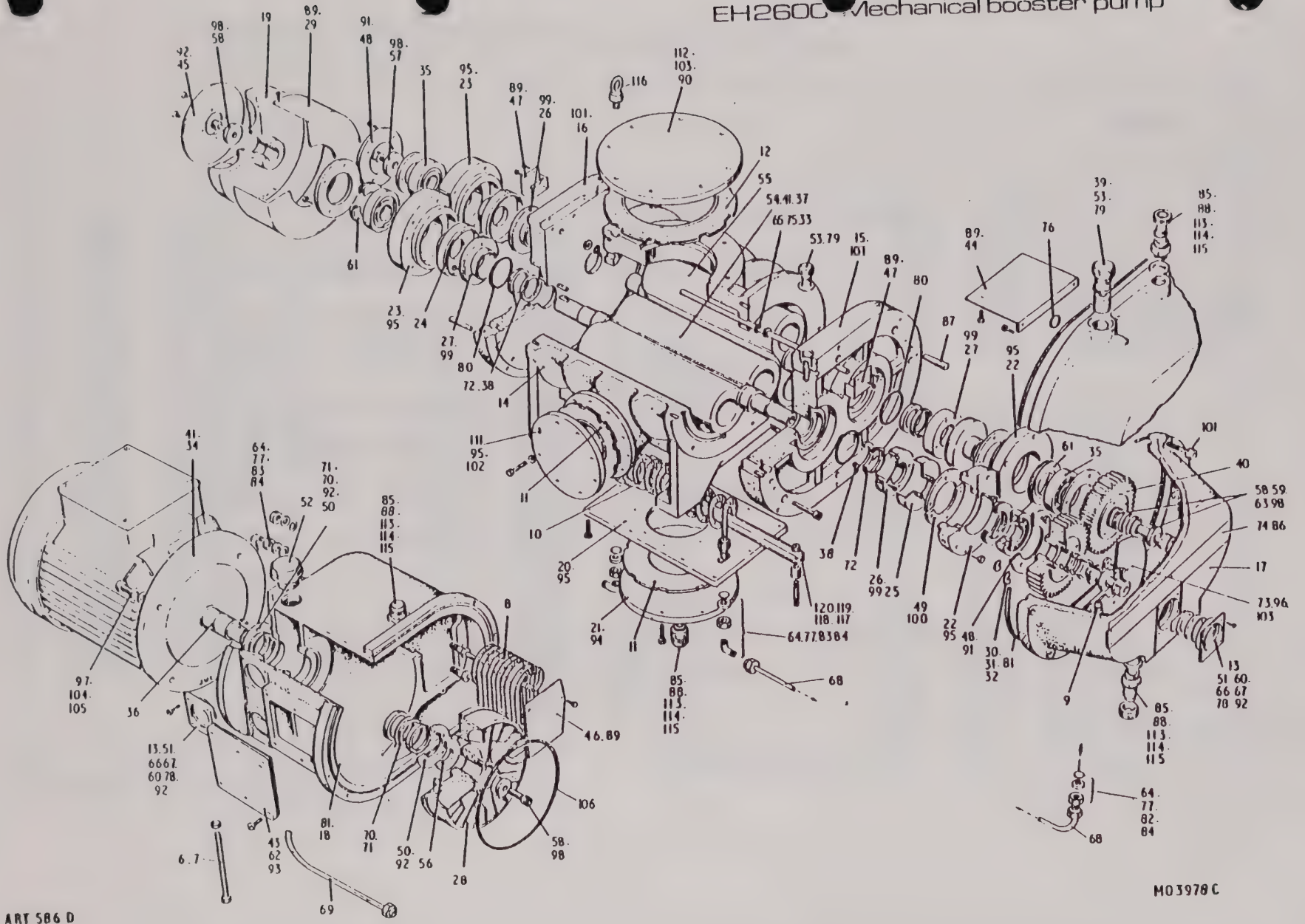
ART 586 D
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EH2600 Mechanical booster pump –Parts list

Item	Code No.	Description	Quantity
1			
2			
3			
4			
5			
6	218082587	Bolt – M16 x 120	1
7	218961414	Nut – M16	1
8	A307510010	Cooling Coil	1
9	A307510011	Gear Cover Cooling Coil	1
10	A307510012	Intercooler	1
11	027150070	100mm 'Co-seal' Pack	2
12	027150073	160mm 'Co-seal' Pack	1
13	A27020008	Compression Ring	3
14	A307510001	Stator	1
15	A307510002	Baseplate – Gear End	1
16	A307510003	Baseplate – Coupling end	1
17	A307510004	Gear Cover	1
18	A307510005	Coupling cover	1
19	A307510007	Fluid Coupling – Driven	1
20	A307510014	Sump Cover Plate	1
21	A307510015	Sump Cover Blanking Plate	1
22	A307510016	Bearing Carrier – Gear End	2
23	A307510017	Bearing Carrier – Coupling End	2
24	A307510018	Throw Ring – Coupling End	2
25	A307510019	Throw Ring – Gear End	2
26	A307510020	Seal Carrier – L.H	2
27	A307510021	Seal Carrier – R.H	1
28	A307510006	Fluid Coupling – Driver	1
29	A307510009	Coupling Enclosure	1
30	A27165001	Shim – 0.05mm thickness	As required
31	A27165002	Shim – 0.10mm thickness	As required
32	A27165003	Shim – 0.25mm thickness	As required
33	A2640600I	Spacer	2
34	A07117001	Motor	1
35	A2040300B	Ball Bearing – 6309 RS	4
36	A27802009	Sleeve (soft)	2
37	A2040500A	Inner Ring – Ir 45 x 55 x 22	4
38	A27302009	Dust Seal	4
39	A27302010	Filter	2
40	A2290300C	Gears	1 pair

Item	Code No.	Description	Quantity
41	A24301007	Key – 10 x 8 x 30 mm	2
42			1
43	A25942993	Cover Plate	1
44	A25970013	Gear Cover Baffle	1
45	A25970014	Coupling Baffle	1
46	A25970015	Oil Reservoir Cover	2
47	A25970022	Evacuation Baffle	4
48	A25971008	Bearing Retainer	2
49	A25971009	Retainer (2 Halves)	2
50	A25971010	Seal Retainer	3
51	A25976001	Sight Glass Reflector	1
52	A26002002	Plug – 1 in BSP (with vent hole)	2
53	A26002003	Plug – ¼ in BSP	1
54	A26401020	Rotor – Driver	1
55	A26301021	Rotor – Driven	1
56	A26407008	Thrust Ring	1
57	A26407009	Thrust Ring	4
58	A26407010	Thrust Ring	4 pairs
59	A26440003	Locking Element – Ringfeder	3
60	A26501011	Sight Glass Rubber	12
61	218985237	Disc Spring Type K6013	1
62	A27159502	Gasket	2
63	A27801003	Clamp Ring	6
64	A27802003	Cooling Coil Spacer	1
65	A27804002	Evacuation Tube	3
66	A29301004	Sight Glass	3
67	A20416001	Sight Glass Bezel	1
68	A27843009	Tube – 2mm o/d copper	1
69	A27843010	Tube – 12mm o/d copper	3
70	H02109050	Spiroseal – DPSM 40 527	2
71	H02109051	Back-up Washer	4
72	H02109054	T.F.E. Lipseal – 72 x 55 x 10 mm	1
73	A25970019	Oil Splasher	1
74	A20001061	Label	2
75	H02120031	O-ring	1
76	H02120013	O-ring	6
77	H02125260	O-ring	3
78	H02120023	O-ring	2
79	H02120061	O-ring	4
80	H02120084	O-ring	2

Item	Code No.	Description	Quantity
81	H02120165	O-ring	1
82	H03505005	Male Stud Coupling – 12mm o/d x ⅜in BSP	3
83	H03505111	Male Stud Elbow – 12 mm o/d x ⅜in BSP	6
84	H01500011	Locknut – ⅜in BSP	5
85	H02105121	O-ring	6
86	A09402040	Rivet – Chobert – 11310304	4
87	212191043	Taper Pin Ø8 x 36LG	5
88	H02104004	⅜in BSP Bonded Seal	21
89	218002328	Screw M5 x 10	8
90	218072454	Screw M10 x 35	24
91	218002371	Screw M6 x 20	21
92	218032328	Screw M5 x 10	8
93	218032330	Screw M5 x 16	8
94	218072412	Screw M8 x 25	34
95	218072413	Screw M8 x 30	4
96	218072450	Screw M10 x 16	4
97	218072493	Screw M12 x 30	5
98	218072574	Screw M16 x 35	16
99	218091328	Cap Screw M5 x 10	12
100	218091372	Cap Screw M6 x 25	40
101	218091453	Cap Screw M10 x 30	8
102	218980210	Plain Washer – M8	12
103	218980211	Plain Washer – M10	4
104	218980212	Plain Washer – M12	4
105	218984012	Shakeproof Washer – M12	1
106	H02120113	O-ring	
107			
108			
109			
110			
111	C10009040	Blanking Flange – ISO 160	1
112	C10011040	Blanking Flange – ISO 100	1
113	C03400007	¾in Vacuum Union Alternative Body	5
114	C03400011	¾in Vacuum Union Blind Tailpiece	5
115	C03400005	¾in Vacuum Union Nut	5
116	218790007	Eyebolt – M16	2
117	B22402003	Stud – M8	2
118	A20103004	Angle	1
119	A27801007	Spacer	2
120	218960210	Nut – M8	2

AH15860

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EH4200 Mechanical booster pump -Parts list

Generally as for EH2600 pump with the following exceptions:

Item	Code No.	Description	Quantity
112	C100 13 040	Blanking flange, ISO 250	1
103	21898 0211	Plain washer, M10	16
94	21807 2412	Screw, M8 x 25 mm	14
90	21807 2454	Screw M10 x 35	12
65	A278 04 003	Evacuation tube	1
55	A264 01 023	Rotor - driver	1
54	A264 01 022	Rotor - driver	1
20	A309 51 003	Sump cover plate	1
14	A309 51 001	Stator	1
12	B271 58 143	O ring seal assembly, 250 mm	1
10	A309 51 002	Intercooler	1
74	A200 01 062	Label	1
116	2187 90 007	Eyebolt, M16	4
118	A201 03 005	Angle	1

The EH500RR series mechanical booster pumps have been modified for reversed rotation and the attached instructions (03-A301-51-881) should be amended accordingly:

1. Reversed rotation models are denoted by the suffix 'RR'.

2. The direction of rotation will be anti-clockwise viewed from the fan end of the motor (indicated by arrow on motor). The INLET and OUTLET connexions are also reversed.

3. Modified and new components are listed in the attached schedule. The schedule ('Parts List') for the EH500 on page 22 of instructions (03-A301-51-881) should be amended accordingly.

4. The gear box has been modified for external evacuation and the external connexions (Items 219, 220 and 221) are supplied separately in a pack. These should be assembled and fitted in the evacuation aperture in the front head-plate (in place of the plastic blank) as shown, Fig.1. Edwards 'Vacsil' sealing compound on the threads of the banjo (Item 219), the banjo is suitable for 3/8 in o/dia. nylon or copper tube.

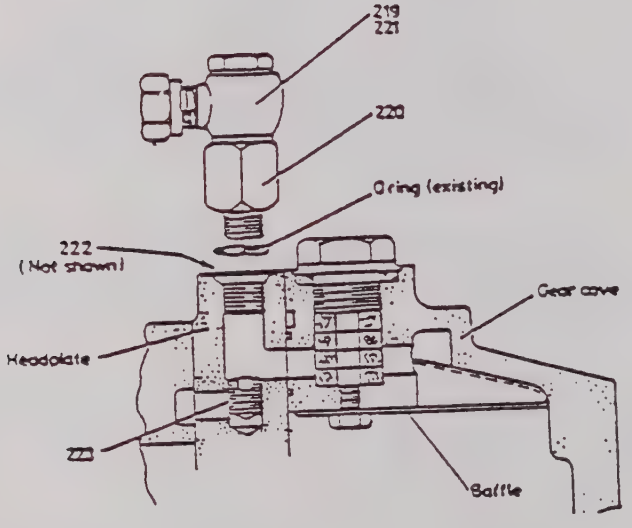

Fig.7 Gear box external evacuation connexion

EH500RR (Code No. A305-62-000) - List of new and modified parts

Item No.	Code No.	Description	Qty.
224	21803-2330	Screw, M5 x 16 mm	2
223	21812-3448	Screw, M10 x 10 mm	1
222	H015-03-001	Redcap	1
221	B011-03-089	Nylon ferrule, 3/8in	1
220	A279-11-007	Adaptor	1
219	H035-02-056	Banjo 3/8in dia. o/d tube x ¼in BSP	1
218	A259-70-052	Baffle plate	1
217	A259-61-001	Filler plate	1
216	A259-70-053	Oil deflector	1
215	A259-70-055	Gear shroud	1
*58	A271-59-529	Gasket	1
++56		Baffle	1
+44		Oil reservoir cover	1
*41	A259-42-009	Cover plate	1
+34		Hex plug ¼in BSP	1
*25	A302-62-004	Seal carrier (right hand)	1
*24	A302-62-005	Seal carrier (left hand)	1
*21	A302-62-007	Bearing carrier (left hand coupling end)	1
*20	A302-62-006	Bearing carrier (right hand coupling end)	1
*16	A302-62-008	Coupling cover	1
11	See sheet 2 GA	Coupling enclosure	1

New parts - Items 215 to 224
* Modified parts
\+ Deleted
++ Replaced by Item 218

HEALTH/SAFETY ASPECTS - VAPOUR DIFFUSION PUMP FLUIDS

Fluid grade	Product class	Flash Point °C	Auto-gnition point °C (approximate)	Fire Point °C (approximate)
Grade 200	A	192	360	214
Apiezon A		210	370	232
Apiezon B		243	405	263
Apiezon C		246	420	293
Silicone 702	B	193	500	275
Silicone 704/F4		221	500	275
Silicone 705/F5		243	500	275
Santovac 5		288	590	350
L9 Fluid		241	370	281
Apiezon AP301		277	450	305
Fomblin		None	None	None

Edwards recommended vapour diffusion pump fluids are not normally harardous when used correctly. However, certain hazards may arise due to misuse or accident and the following precautions should be observed to avoid danger to health or safety:

Skin and eye contact

Class A - Mineral oil based fluids are only slightly to moderately irritating to skin and eyes. Prolonged exposure of skin to mineral oils may give rise to dermatitis.

The main precautionary measures entail minimising contact with the skin and the observance of good hygiene. Where skin rashes or other abnormalities occur as a result of prolonged contact with mineral oils, medical advice should be sought immediately.

Protective clothing, regularly laundered overalls and personal clothing plus careful skin cleansing, are all important measures to limit contact. Such measures are detailed in HM Factory Inspectorate Cautionary Notices, SHW 295, Effects on the Skin of Mineral Oil and SHW 397, Effects of Mineral Oil on the Skin.

Class B - These non-petroleum based products are in general only slightly irritant. Prolonged exposure may however, give rise to dermatitis. As with the previous classes of products, the principal precautionary measures are to minimise contact with the skin and observe good hygiene.

Inhalation

Class A - These products do not normally give rise to harmful concentrations of vapour except where high temperature and open system are involved.

Class B - Edwards recommended products in Class B are particularly inert and are unlikely to give rise to harmful vapours when used in the applications for which they are recommended.

Care should, however, be taken to avoid inhalation of vapours or mists arising from undue heating or excessive mist generation. In the case of fluorinated compounds (eg. Fomblin, Halocarbon) avoid contact with excessive heat (300°C) eg. lighted cigarettes, heater elements, etc.

Ingestion and Aspiration

Ingestion and aspiration of fluids are not regarded as health hazards likely to arise in normal industrial use.

In the unlikely event of accidental ingestion (swallowing), the main hazard is aspiration of liquid into the lungs. Class B products are believed to be of slight to moderate oral toxicity.

Fire Hazards, storage and spillage

These products require no special fire precautions but it is recommended practice to store away from heat. When heat is required to facilitate handling of the product, this should be kept to a minimum.

If the pump operates in close proximity to possible sources of ignition or where oxygen may form a large proportion of the pumped load, then suitable fire-resistant fluids such as Fomblins should be utilised. Fomblins are fully fluourinated perfluoropolyethers and are non-toxic; they are practically inert chemically and have no flash point or fire point.

Fluid spillage should be absorbed with sand, earth or mineral absorbent and disposed of in accordance with the Disposal of Poisonous Wastes Act and Control of Pollution Act 1974.

In the event of large spillages, steps should be taken to prevent pollution of drainage systems, rivers or waterways, or infringement of the above acts.

COMMUNICATION WITH EDWARDS

Any communication relating to the subject of this instruction should be addressed to Edwards High Vacuum or to the supplier from whom it was purchased.

Please specify:

1) the model, serial number and code.

2) the date of purchase.

3) your order number and the suppliers sales reference.

Equipment should not be returned to the supplier without prior arrangement.

IMPORTANT Health and Safety

Under Section 3 of the Health and Safety at Work Etc Act 1974 every employer has a duty to conduct his business so as not to expose persons not in his employment to risks to their health and safety. When goods are returned to the supplier, therefore, warning must be given if their usage is likely to render the equipment hazardous in any way.

Edwards High Vacuum and its distributors reserve the right to refuse acceptance of any equipment returned which they have reason to believe may be hazardous.

Damage in transit

If any damage has occurred in transit, it is important to inform both the carrier and the supplier within three days of delivery.

MP MASTER
MA32913